the OIL AND GAS JOURNAL

JANUARY 27, 1958

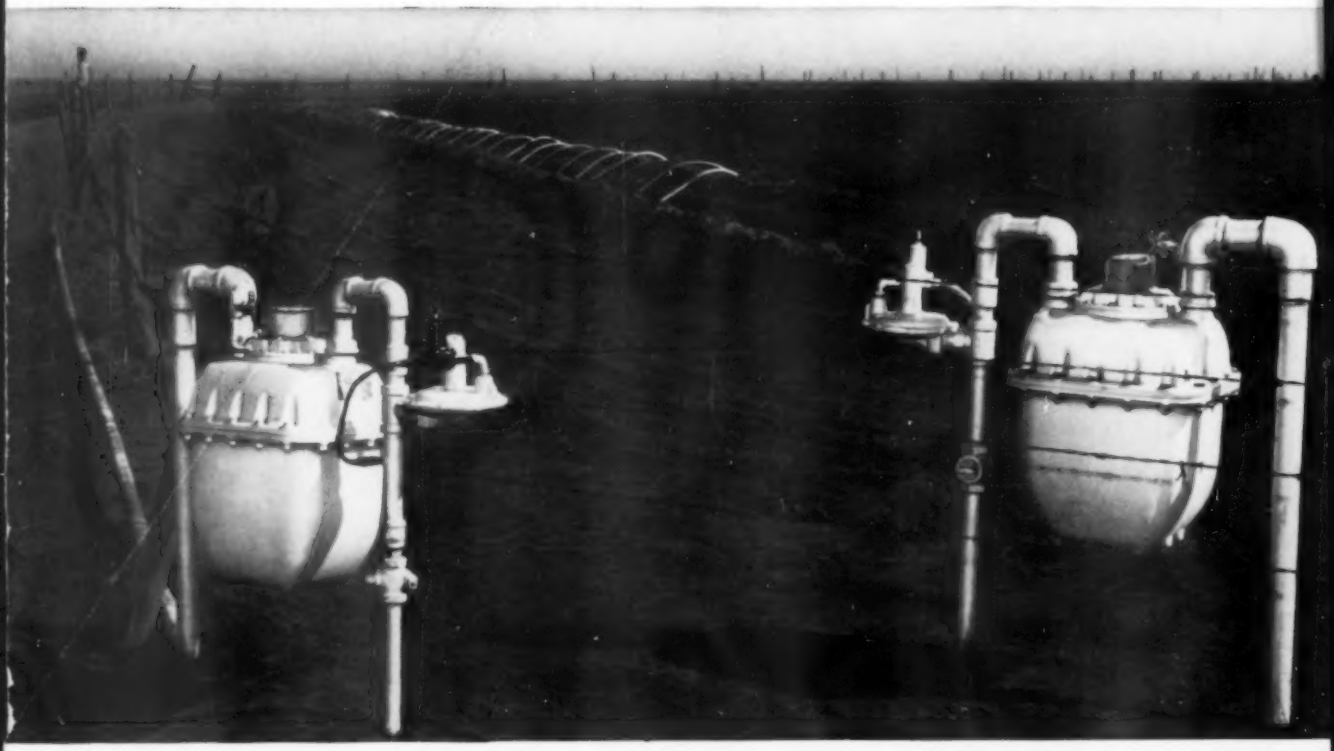
REVIEW-FORECAST

. . Journal editors scan the past, peer into the future to provide

GUIDEPOSTS IN PLANNING

Starts page 145

For irrigation . . . or any field service up to 100 psi



Two Rockwell "1600" meters with Rockwell "173" regulators (gas loaded) serving engines pumping water to irrigated fields in Texas.

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ROCKWELL "1600" ALUMINUM GAS METERS

Whatever your needs for field measurement, you can fill these needs best with the Rockwell "1600." Just consider these advantages. The Rockwell "1600" has a rust-proof, impact-resistant aluminum alloy case. Weighing only 63 lbs., one man can easily carry and install it. Single joint construction reduces the possibility of leakage—simplifies access to the inner mechanism, which is removable and interchangeable as a unit.

There's a generous capacity rating of 1600 cfh at 4 oz. inlet pressure. This capacity can be increased substantially by measuring gas at higher pressures—up to 100 psi. Corrections to base pressure from higher pressures are accomplished by fitting the "1600" with either an Emcorector or a Combined Record gauge. Write for literature. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ALUMINUM GAS METERS

another fine product by

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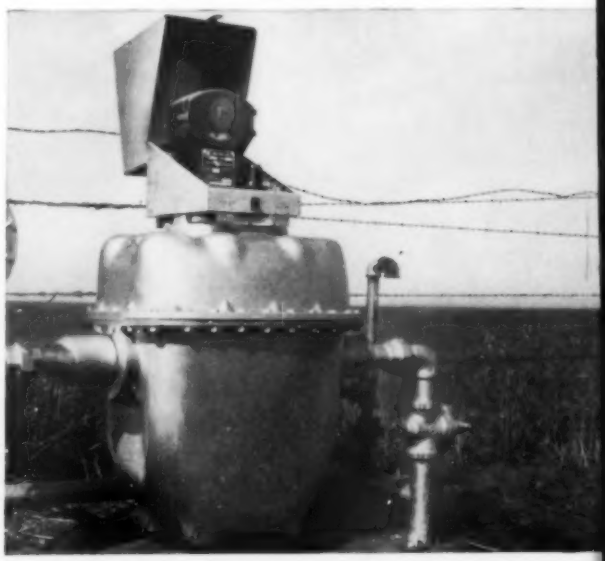

This Rockwell "5000" aluminum meter with Emcorector is the master meter for five irrigation wells, submetered by five Rockwell "1600" meters.

OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
Jan. 27, 1958

Some optimism shows through 1958 oil-industry budgets:

Capital expenditures for the year are expected to reach $6,024,000,000 (p. 190).

That's $24 million above last year, and may surprise many who predict 1958 will be an off year.

Drilling-production spending accounts for the jump.

A Journal survey shows $3.88 billion budgeted in this division of the industry. It's a $280-million increase.

All other divisions show only slight dips from 1957.

DRILLERS will complete 52,134 wells during the year.

This is a reduction of 1,704 wells from 1957, which experienced a 4,322-well decline from the year before.

Wildcats will be up 169 wells to 11,908.

Field wells will drop to 40,226 (p. 146).

The drilling story for 1957: Completions down 7.4 per cent to 53,838; oil wells off 10.6 per cent; gas wells down 4.9 per cent; wildcatting down 9.9 per cent (p. 148-152).

Rig activity followed this downward trend, too. Drilling in 1957 required 219 less rigs on the average than in 1956. Rigs working, however, drilled more wells. The average was 18.67 wells per rig compared with 18.24 in 1956.

PRODUCTION men face some cutbacks in 1958. High stocks at end of 1957 and demand outlook for 1958 point to this.

Crude output in 1957 showed only a slight increase figured on an average daily basis despite the abnormal production pattern created by the Suez crisis. The average was 7,167,900 bbl. daily, a gain of 16,900 bbl. (p. 156).

Natural-gas production gained 5.5 per cent, topping 10,638,600,000 M.c.f.

Petroleum reserves moved up. Crude reserves topped 33 billion barrels with net additions of 857 million barrels. Natural-gas liquids gained 267.5 million barrels to total 6.7 billion barrels. Gas reserves increased 10.5 trillion cubic feet.

EXPLORERS still have plenty of wildcat targets.

Journal editors see these events in 1958 and beyond (p. 204-233).

Paradox basin is still hot. Success will spill over into Colorado. You can count on a drilling campaign for the northern Paradox. Interest will swell in Black Mesa. San Juan gas basin will be ringed with oil fields.

Williston basin is coming back. Tempo of pre-Madison drilling will pick up. Play in border counties will rival Saskatchewan, and there'll be increased southwest activity.

California will see offshore drilling pick up, townlot activity increase, more Mountain View drilling, and more gas from the north.

New Mexico can count on more wildcatting in the northeast and deep drilling on rim of Delaware basin.

Southwest Texas still looks good. In the picture: First production at Pescadito, first Smackover discovery, and a major discovery in the far western counties.

West Texas' future holds more ultradeep wildcats, some successes in Sheffield channel. This will prompt a new look at the Delaware and Val Verde basins.

Oklahoma, fresh from one of its best wildcat years, can count on more Palo Duro basin oil, increased Ordovician search, and increased deep drilling.

Louisiana offshore faces another banner year. Outlook for 1958 is 800 wells drilled, 25 new fields. Drilling will go 70-100 miles offshore, in water up to 200-ft. deep.

Washington hit the oil news in 1957. This will be followed by brisk wildcat campaign in Pacific Northwest. Play ultimately will extend into Vancouver area.

Western Canada made gas news last year. Now the Foothills gas belt will reach the British Columbian border. There'll be more Slave Point discoveries and more new oil fields in British Columbia.

Appalachian basin, America's oil cradle, is coming back. Lake Erie drilling will pick up this year, and there'll be increased search for Silurian production in Ohio.

REFINERS face a tight situation in 1958.

They need only increase average daily crude runs by 85,000 bbl. to meet product demand this year (p. 170).

Domestic demand is expected to increase 3.8 per cent. It gained only 0.2 per cent in 1957. Product exports will be off this year after gaining 25.6 per cent in 1957.

Refinery runs last year averaged 7,919,000 bbl. daily, down 17,000 bbl. daily from 1956. They probably will average 8,053,000 bbl. daily this year.

Prices still are a problem. Markets have started out the year soft. This follows sharp drop in plant realizations in

1957 and adds to the burden of boosting motor-fuel octanes and quality of other products.

Refinery yields also shifted in 1957. Refiners made more gasoline and distillate and less kerosine and residual from a barrel of crude.

PIPELINE building will continue heavy in 1958.

A record construction year was achieved in 1957. The outlook for this year is nearly as good. Canadian and U. S. firms told the Journal of plans that add up to this:

Natural-gas lines—14,700 miles.

Crude—3,000 miles.

Products—1,700 miles.

The record for 1957: 15,400 miles of gas lines, 4,800 miles of crude lines, and 2,900 miles of products lines.

New threats to voluntary control of imports may force a switch in the Government program.

IPAA executive committee already has drafted a new set of control plans. They'll be studied this week by other independent producer organizations.

Heart of IPAA plan is to put teeth into controls by:

...Penalizing imports in excess of quotas by imposing a 30 per cent duty amounting to about $1 per barrel.

...Writing into law a rule that imports should keep their 1954 relationship to domestic demand.

Move toward tighter controls followed arrival of first crude cargo for an unlicensed importer (p. 123).

What's the outlook in steel for oil-industry users?

Supply is about as good as anyone could hope for.

The steel industry has begun the year with falling backlog of orders and plenty of blank spots in order books. In addition, plant capacity was increased last year. So barring a long strike or all-out defense emergency, there'll be plenty of steel goods.

Steel prices may be another thing.

Chances of another price boost in July are good.

The increase could be as much as $5 a ton on basic steel. It was $6 last year.

Back of prospects for higher prices are new increases in steel workers' wages. Workers in basic steel are due a 13-cent hourly wage increase under union contracts. They also stand to get a cost-of-living increase this month and again in midyear.

New AAODC statistics show drillers still in bind.

Total rotary-drilling costs have reached highest point in 17 years. Prices per foot received by contractor for his work dropped in 1957 to $4.60, a 10-year low.

At same time drilling efficiency, as measured by average drilling time, remained the same.

It means drillers are caught between high costs, low prices and aren't able to beat the system by efficiency.

Rig activity meanwhile is taking rough winter tumble.
Tools working last week totaled only 1,957, a drop of 105 from the week before and 225 from first week of month.
A better comparison: Rigs working now are down 356 from this time last year and 600 from 1956.

Right of states to fix minimum gas prices has been knocked out again by the Supreme Court.
In a quick decision the high court reversed Kansas Corporation Commission order putting floor of 11 cents per M.c.f. under Hugoton field gas.

Merger may be brewing involving Coastal Transmission Corp. and Houston Texas Gas & Oil Corp.
Officials of both companies are reluctant to talk, but the consolidation is considered a good possibility.
Companies have FPC approval for a 1,500-mile main line to move natural gas from South Texas and Louisiana fields to new markets in Florida. Work is expected to start this spring.

Natural-gas common stocks took on a bargain-counter look at the beginning of the month.
Result of the price decline in December following the Memphis decision was to give investors highest rate of return in nearly 5 years.
Index price of 30 stocks was $34.72 or 12.3 per cent below a year ago. Average dividend of $1.90 per share was 1.1 per cent higher, giving an average yield of 5.47 per cent. The return represents a gain of 15.2 per cent.

Notes for refiners: Market for kerosine-type jet fuels is due shot in arm. American Airlines, with 30 Boeing 707's and 35 Lockheed Electras on order, has asked for bids on fuel. Its specifications closely parallel those of ASTM. American will need about 300,000,000 gals. per year...Government is taking another look at submarine tanker. Chairman Clarence G. Morse of maritime board revealed plans to Portland, Me., Propeller Club last week.

Exploration notes: Hunt oil interests of Dallas have filed jointly for drilling rights on a block of more than 800,000 acres in northeastern Alaska in Kandik River area...King-Mill Oil has hired a Caracas firm to evaluate its Block 26 in Venezuelan State of Barinas. Seismic survey starts this month, and firm plans two 13,000-ft. wildcats during next dry season...Rimrock Tidelands is going abroad by buying out Swiss firm which has big concession in France's Aquitaine basin...

Good Wells Make Good News

A Monthly Report Of Successful Well Treatments

January 27, 1958

Operators who want to reduce production costs and increase ultimate recovery and profits are using Dowell acidizing more and more. Here are some recent examples showing how Dowell "tailors" acid treatments to the requirements of the well.

- **Plaquemines Parish, South Louisiana.** Dowell acidizing increased gas production from 2 million to 4 million cfd at a cost of $1003. Treatment paid out in about 5 days, based on 10 cents per thousand for gas. This well, in the Main Pass area, was completed in the Miocene sand (7967 to 7978 feet). A three-stage treatment was used, beginning with 500 gallons of low surface tension acid. Next, 500 gallons of Mud Acid was injected, then another 500 gallons of low surface tension acid. *This treatment has worked well in many Miocene sands. Although these sands exhibit low solubility in regular acid, many show 35 to 45 per cent solubility in Mud Acid.*

- **Galveston Bay, Texas Gulf Coast.** Gas delivery from this well was nearly tripled and the operator received a six-day payout as a result of a Dowell acidizing treatment. This well had been completed in the Frio sand (10,369 to 10,375 feet). Gas deliverability to the pipe line had declined to 692 mcfd. Dowell acidized, using 1000 gallons of low surface tension acid. Treatment down tubing averaged 1¼ bpm at 2900 psi, breaking to 1500 psi. Cost of the treatment was $480. *After treatment, deliverability rose to 1900 mcfd. This represented a net gain of over 1200 mcfd.*

- **McKenzie County, North Dakota.** Potential of this new well was increased from 41 bopd to 440 bopd after a treatment by Dowell using 2500 gallons of Mud Acid. This well, completed in the Sanish sand (10,320 to 10,330 feet) of the Antelope field, had tested 41 bopd before being killed with mud to set up for a dual completion. Since the packer was set at 9296 feet, a large volume of mud had to be removed from the annulus as well as the formation face. *Dowell treated with 30 gallons Freflo® in 33 barrels lease crude followed by 2500 gallons Mud Acid down tubing. Breakdown pressure was 8900 psi and acid was displaced at 5700 psi.*

- **Beaver County, Oklahoma.** A new well potentialed 480 bopd through a ¼-inch choke after Dowell performed a two-stage acidizing treatment. The well, completed through perforations into the Chester lime (6542 to 6563 feet), died after 30 minutes flush production. Dowell acidized with 500 gallons Mud Acid, and the well was swabbed. Then 5000 gallons Retarded Acid was injected down tubing at 4 bpm and at pressures ranging up to 1000 psi. *After the well was swabbed clean, it made 292 barrels of oil in the first 8½ hours.*

Dowell now offers 41 addition agents to "tailor" acid to your requirements. Moreover, your Dowell engineer has an unparalleled fund of experience and laboratory facilities upon which to draw when he helps you plan a treatment. Each acidizing treatment he recommends is designed to give you the best results for your money. For more information or service, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma.

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ANNUAL REVIEW-FORECAST

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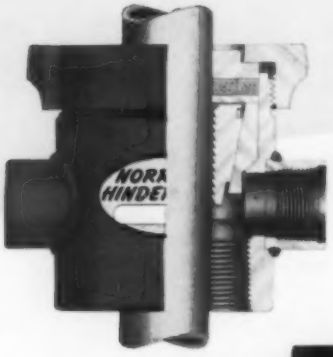

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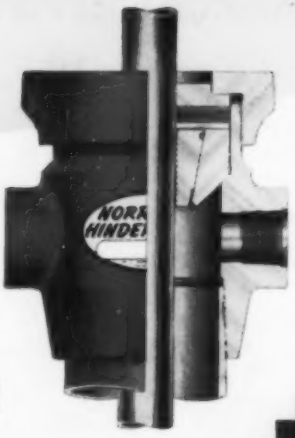

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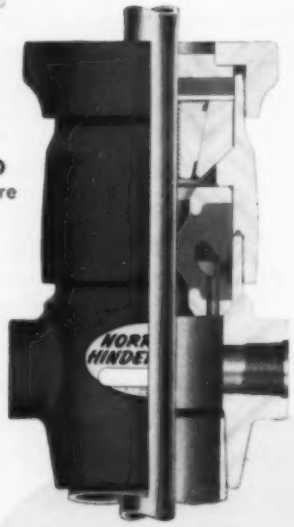

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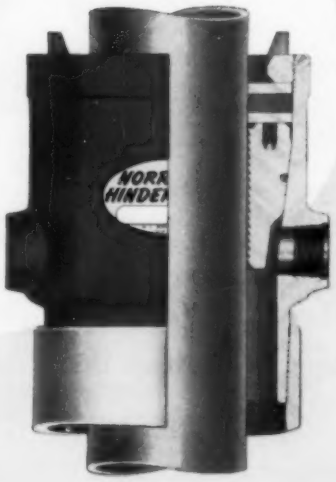
1000# C.W.P.



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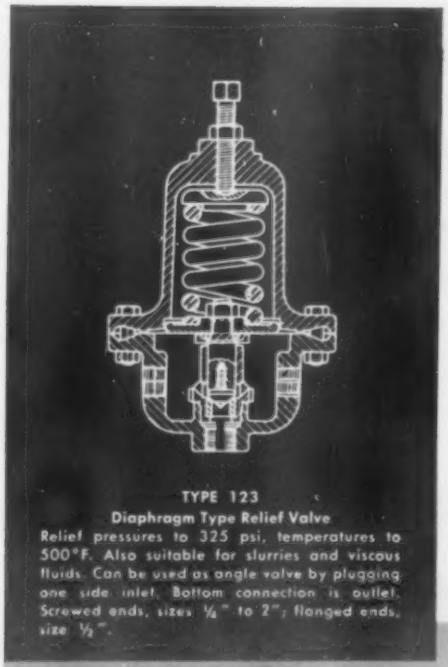

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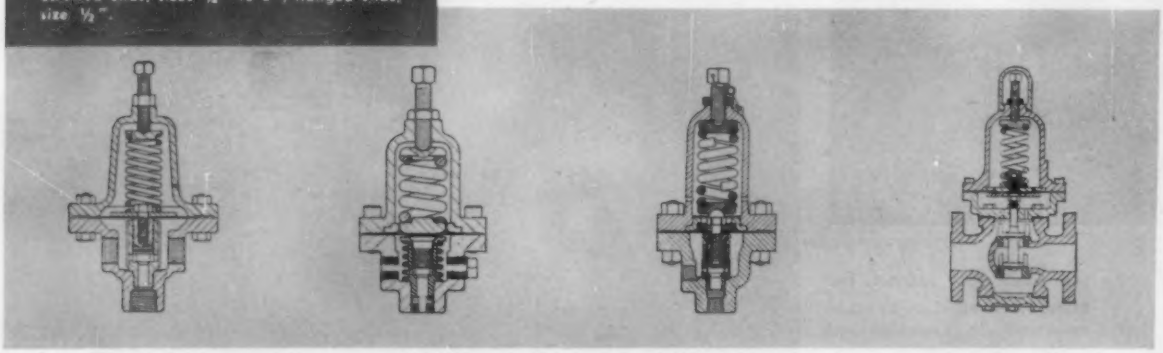

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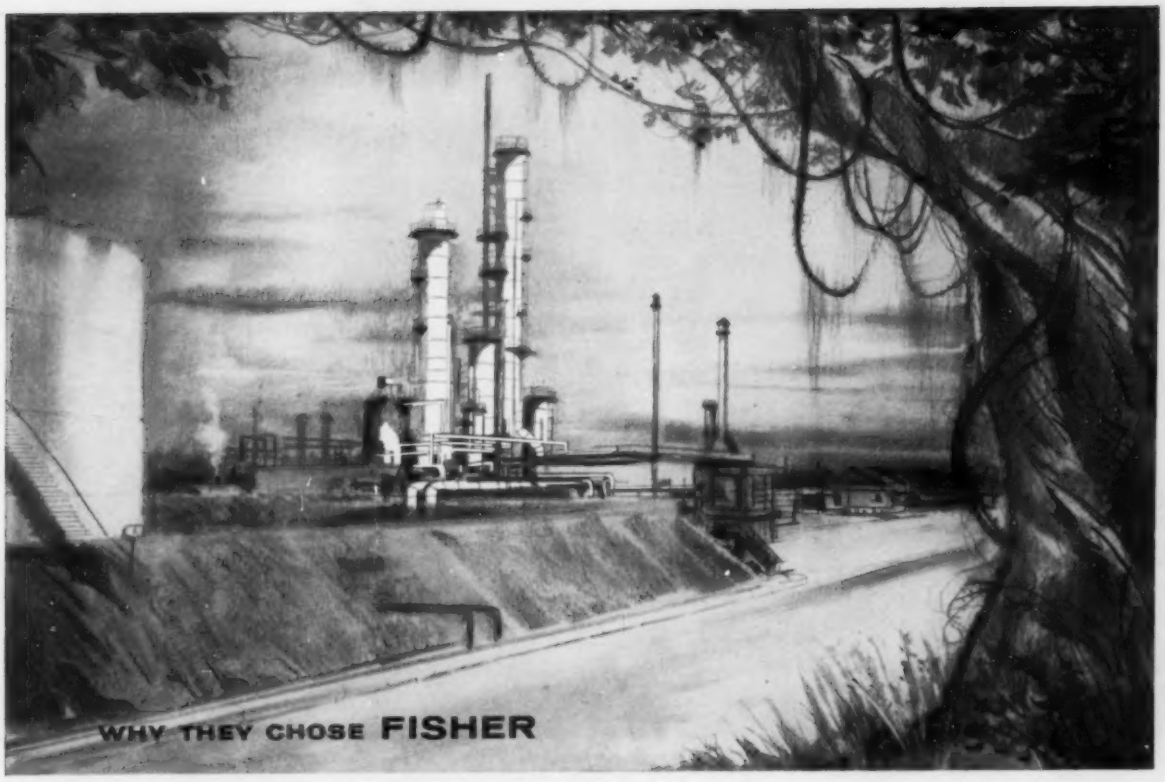
Says Claude (Slim) Anderson, Tool Pusher . . ."In all of my 17 years' experience in Canadian and United States oilfields, I have worked on many types of rotary rigs; but I found this 'Oilwell' 76 to be the most trouble-free rig I have encountered. During the operational life of the draw works and rig drive, it has not been necessary to replace any chain. However, a few months ago, a rotary drive chain was replaced as a precautionary measure. Except for minor repairs, we have shut down the rig only for preventive maintenance."

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL" TRADE MARK

UNITED STATES STEEL



A thousand miles up the Amazon

CONTROLS MUST FUNCTION... *WITHOUT PAMPERING!*

A thousand miles up the Amazon puts you about 200 miles south of the Equator—and a whale of a long way from service, as we know it. But, nevertheless, there stands the Manaus Refinaria del Companhia de Petroleo da Amazonia, complete with the most modern refining equipment.

Here, every bit of equipment must stand on its own merit... there is no time for pampering. Sources of supply and repair are too far away to help much.

So, when they hacked this refinery out of the jungle, they chose *Fisher* control valves and liquid level controls.

In a recent report, Arturo Amorim, Vice President and Director of Operations, states, "... All are delivering excellent performance"!

Which again proves that you can't beat more than three quarters of a century of *Fisher* engineering know-how for day-after-day dependability.

Manaus Refinery
COMPANNIA de PETROLEO da AMAZONIA
Designed by
SOUTHWESTERN ENGINEERING COMPANY
Los Angeles, California
Inaugurated September 6, 1956

Fluid Catalytic Cracking Unit
Designed by
UNIVERSAL OIL PRODUCTS COMPANY
Des Plaines, Illinois

CONTROL VALVES—LIQUID LEVEL CONTROLS
Supplied by
FISHER GOVERNOR COMPANY
Marshalltown, Iowa / Woodstock, Ontario

FISHER GOVERNOR COMPANY
Marshalltown, Iowa / Woodstock, Ontario

FISHER® Controls

SINCE 1880

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROLS

Stocks at Bethlehem Supply stores are carefully planned to meet the needs of the local areas served. Always available are large varieties of valves and fittings, hose and packing, gaskets, belting, paint, hardware, drilling and pumping equipment, pipe, wire rope, and many other items needed day by day.

The WELCOME Mat is a Trademark of Ours

We know a production superintendent who's a frequent visitor at Bethlehem Supply stores. Says he likes to go in because they're always so clean, neat, and well-stocked. Says he also likes the friendly atmosphere, and the helpfulness of the store personnel.

Hearing him talk that way always makes us feel good . . . because that production superintendent is so typical of many others in the areas we serve.

We're mighty sure that customer good will has helped us build from virtually nothing, twenty years ago, to a network that now includes sixty-one stores. Today Bethlehem Supply covers a pretty big territory—from eastern Illinois to the Pacific, and from the Gulf Coast to North Dakota. That's our domestic spread. And Bethlehem Supply Company of Canada, Ltd. has recently opened an office at Calgary, Alberta, and a full-fledged store in Edmonton.

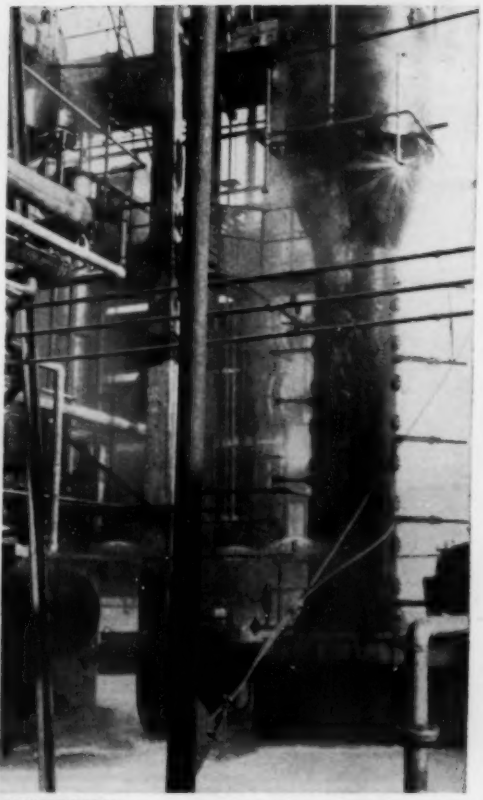
But one thing we can promise you. We'll never get so big that we forget the things that made us grow. Now or years from now, you can count on the same friendly service you've always received at Bethlehem Supply.

BETHLEHEM SUPPLY COMPANY
General Offices: 21 E. Second St., Tulsa, Okla.
West Coast Headquarters: Los Angeles, Calif.
Canadian Distributor: Bethlehem Supply Company of Canada, Ltd. Calgary, Alberta, Canada
Export Distributor: Bethlehem Steel Export Corporation 25 Broadway, New York, N. Y.

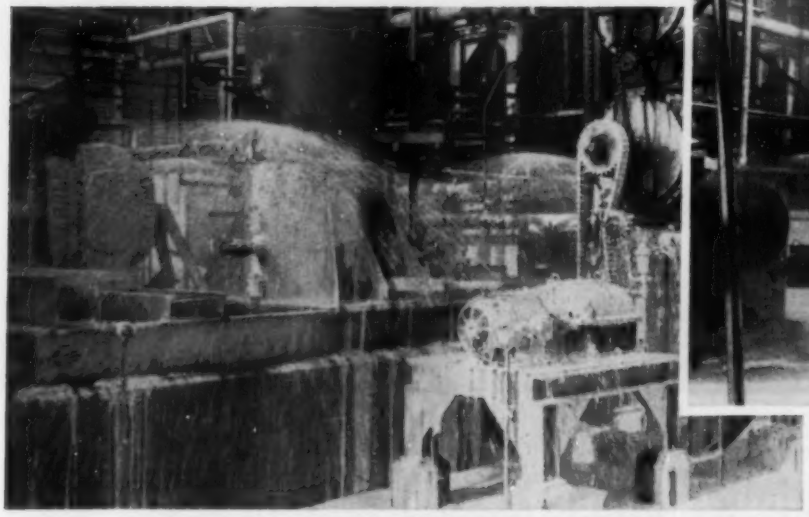
BETHLEHEM SUPPLY

BETHLEHEM STEEL

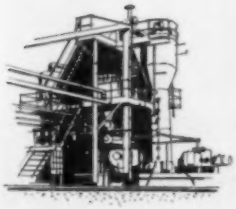
Tough Fire Protection Problem Solved by GRINNELL



▲ Grinnell ProtectoSpray on upper part of unit cools equipment and washes burning oil and solvent into area protected by foam blanket below.



▲ Grinnell ProtectoFoam safeguards the lower section of hexane solvent extraction unit with a blanket of foam, to prevent formation of explosive mixtures.



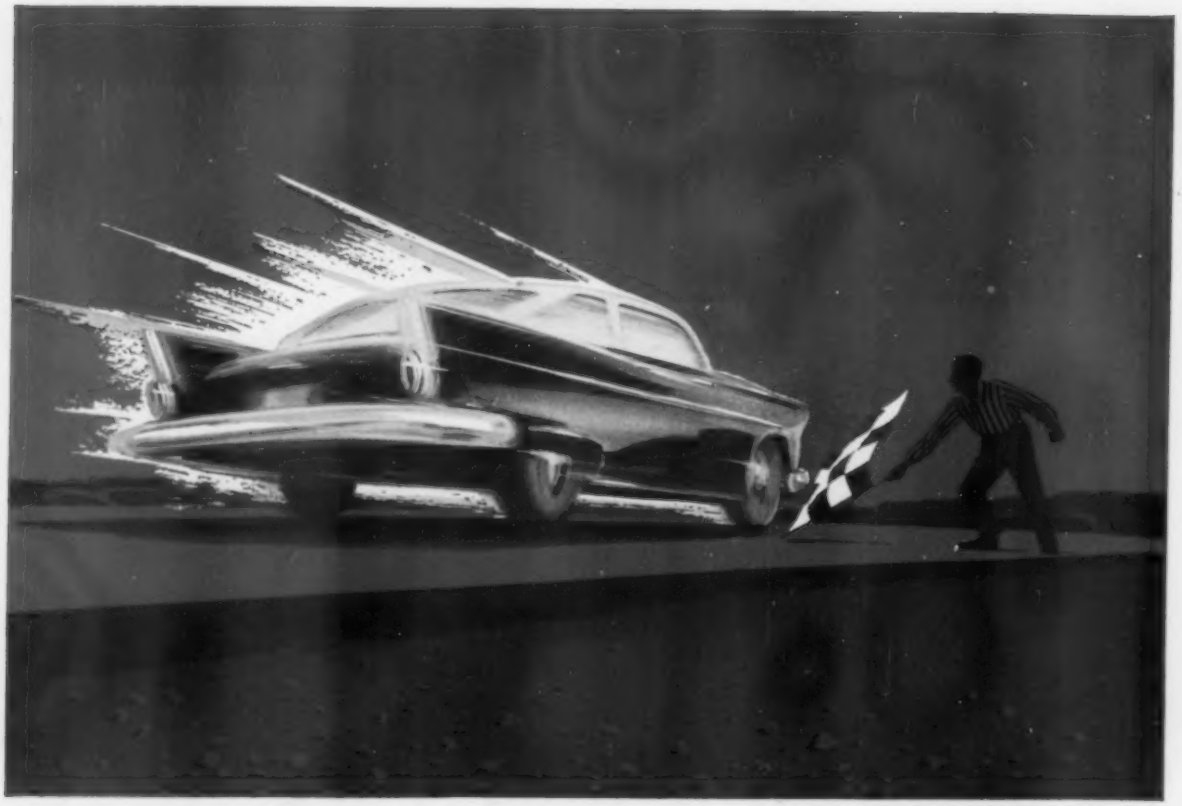
At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, hexane solvent is used in extracting vegetable oil from soybeans. Because of the highly flammable nature of the solvent, Grinnell designed a special system for this unit, consisting of 162 ProtectoSpray nozzles — to drench the superstructure with fine water spray; and 24 ProtectoFoam spray heads — to blanket the diked area with foam. This water-foam combination protects the lives of personnel, as well as shielding equipment from costly damage.

Solving tough fire problems like this with installations engineered to the hazard, tailored to the need, built of highest quality materials is something Grinnell has been doing successfully for more than 85 years. Check the list below for the Grinnell System suited to your requirements. Or, tell us about the fire hazard you face, and let us suggest the proper installation for you. Grinnell Company, Inc., 277 West Exchange Street, Providence, Rhode Island.

Grinnell Fire Protection Systems include:

- Automatic spray sprinklers — wet pipe, dry pipe, Simplex, and deluge systems
- Emulsion and vapor dilution extinguishment with water sprays — Mulsifyre and ProtectoSpray systems
- Cooling, insulation and controlled burning with water sprays — ProtectoSpray systems
- Mechanical foam blanket — ProtectoFoam systems
- Carbon dioxide systems
- Dry chemical systems

Manufacturing, Engineering, and Installation of Fire Protection Systems since 1870



For those new, higher compression engines...
a new Catforming catalyst

The trend to higher compression engines is here to stay. And wide-awake refiners have to produce fuels to suit these up-to-the-minute engines.

Atlantic is proud to offer an advanced Catforming catalyst designed to economically produce higher octane gasolines . . . *and it can be utilized in your present equipment.* For more information, write, wire or call The Atlantic Refining Company, P. O. Box 8138, Philadelphia 1, Pennsylvania.

Higher gasoline octanes through Pentafining

You can convert the low-quality n-paraffins (C_5, C_6, C_7) in your gasoline pool to high octanes! Pentafining, the process developed by The Atlantic Refining Company, makes it possible. For full particulars, write today to The Atlantic Refining Company, P. O. Box 8138, Philadelphia 1, Pennsylvania.

It's the CATALYST that counts

ATLANTIC

HYDRANTS FOR PLANT PROTECTION

Types and sizes for every requirement

YOU'LL be ahead on many counts when you specify modern Darling Fire Hydrants. Just for example . . .

Your system can include hydrant types exactly right for special or unusual service needs — breakable coupling types where traffic damage is common, concealed flush types for airport and pavement installation, Tee-base types to eliminate lateral connections where practicable. These and a few of the other types are shown here.

Equally important, Darling's unique B-50-B development (now available in all except the Tropical type) introduces *ball-bearing* operation combined with "O" ring seals. Result: a packless, dry-top hydrant. No packing gland maintenance. Operating threads and bearings *stay* lubricated and water can't reach them. Operation is far easier, far faster . . . and you avoid lots of maintenance time and trouble.

Send for complete information. Better still, ask to have a Darling engineer check your needs and tell you just what you stand to gain with Darling Hydrants.

TRADE DARLING MARK

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by The Canada Valve & Hydrant Co., Ltd., Brantford 7, Ont.

ONE OF THE DRESSER INDUSTRIES

CLARK

CLARK BROS. CO., Olean, New York—Gas turbines, engines, and reciprocating, centrifugal and axial flow compressors — gas, steam, electric and diesel driven.

DRESSER IDECO

DRESSER-IDECO COMPANY, Columbus, Ohio — Radio and television broadcasting towers, steel buildings, aircraft hangars, electric power substations.

DRESSER MANUFACTURING DIVISION

DRESSER MANUFACTURING DIVISION, Bradford, Pa. — Pipe line couplings, pipe repair sleeves and clamps, weldments, forgings, welding fittings, flanges, rings.

GUIBERSON

THE GUIBERSON CORPORATION, Dallas, Tex. — Swabs, packers, anchors, workover equipment — drilling heads, blowout preventers, tubing blocks, hooks, swivels, kellys, savers, unions. Gas lift equipment. Molded rubber products.

LANE WELLS

LANE-WELLS CO., Los Angeles, Calif., Houston, Tex., Oklahoma City, Okla.—Electric and Radioactivity Well Logging, Koneshot* perforating, bullet perforating, packers, bridging plugs.

Magcobar.

MAGNET COVE BARIUM CORP., Houston, Tex.—Magcobar* and Magcogel* drilling muds and other specialized oil well drilling fluids and chemicals.

PACIFIC

PACIFIC PUMPS, INC., Huntington Park, Calif. — Centrifugal pumps for refineries, power stations, pipelines, and chemical plants; plunger pumps for oilwells.

ROOTS-CONNERSVILLE

ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind.—Rotary positive blowers, gas pumps, centrifugal blowers, exhausters, vacuum pumps, and positive displacement meters.

* Trademark registered

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO., Houston, Tex.—Seismograph systems and instruments—electronic, electro-mechanical. Computers—analog and digital; recording systems. Special transformers, reactors.

WELL SURVEYS

WELL SURVEYS, INC., Tulsa, Okla.—Nuclear and electronic research and development for the petroleum and other industries. Originators of radioactivity logging.

Tomorrow's Progress Planned Today

Look for this symbol

...it identifies all Dresser Companies and their products... it is your guarantee of the DRESSER *plus*

You gain an important extra plus value every time you are served by any of the Dresser companies. This is the unique way Dresser operates to serve you better. Each Dresser company works independently to assure maximum individual attention to your specific needs... yet all are teamed together in a single organization to provide a group of research, engineering, and manufacturing services. From Dresser you obtain equipment based on the over-all experience of many companies in many industries.

As performance demands on equipment become increasingly greater, Dresser will continue to pace the technological changes in your field. You can count on the Dresser companies as major suppliers of equipment researched and developed to serve you better and meet your future needs.

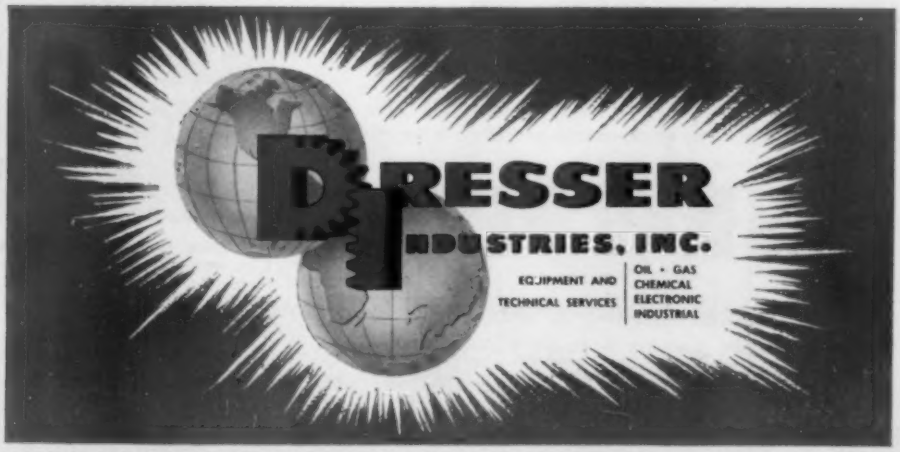
Wherever you are, whatever your needs, specify equipment from Dresser companies. No other single organization offers you the same broad range of "know-how" coupled with individual company attention to these specific needs. Be sure to look for this symbol – it's your guarantee of the Dresser *Plus*... the mark of superior equipment and services which have become the standard of comparison the world over.

IDECO

IDECO, Dallas, Tex.—Hydrair* and Power Rigs; Full-View* Masts; substructures; single, dual and Drive-In Rambler Rigs; blocks, swivels, rotaries; mud pumps; petroleum equipment and supplies.

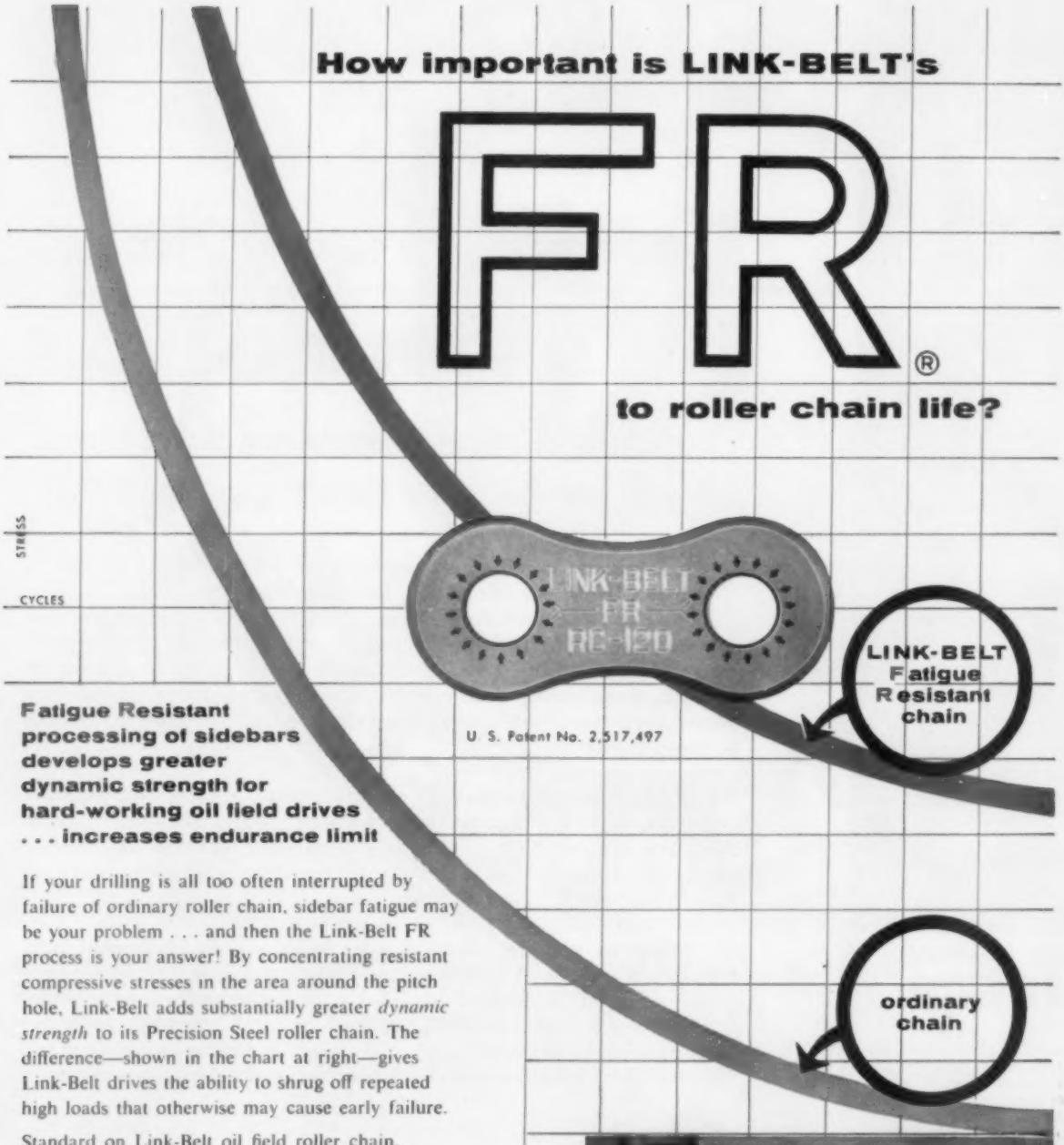
Security

SECURITY ENGINEERING DIVISION, Dallas, Tex., Whittier, Calif. — Rock bits, reamer rock bits and hole openers; reamers, casing scrapers and Neo-Red rubber stabilizers.



REPUBLIC NATIONAL BANK BUILDING • POST OFFICE BOX 718 • DALLAS 21, TEXAS

How important is LINK-BELT's FR® to roller chain life?



U. S. Patent No. 2,517,497

Fatigue Resistant processing of sidebars develops greater dynamic strength for hard-working oil field drives . . . increases endurance limit

If your drilling is all too often interrupted by failure of ordinary roller chain, sidebar fatigue may be your problem . . . and then the Link-Belt FR process is your answer! By concentrating resistant compressive stresses in the area around the pitch hole, Link-Belt adds substantially greater *dynamic strength* to its Precision Steel roller chain. The difference—shown in the chart at right—gives Link-Belt drives the ability to shrug off repeated high loads that otherwise may cause early failure.

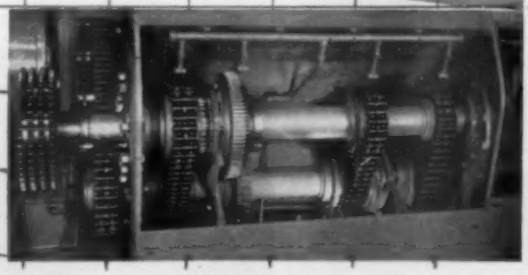
Standard on Link-Belt oil field roller chain, FR is supported by many more "extras." Any leading supply store in the field will gladly explain their importance, and furnish you a copy of Link-Belt Catalog 2780.

14,660

LINK-BELT

ROLLER CHAINS & SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Shreveport, La., Los Angeles 22 (Montebello), Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields.



NATIONAL SUPPLY 80-B DRAWWORKS is equipped with Link-Belt FR roller chain for extra dependability. Other important Link-Belt roller chain extras:

- SHOT-PEENED ROLLERS with greater fatigue life.
- PRE-STRESSING for load-bearing uniformity.
- E-Z ASSEMBLY to facilitate field installation.
- SHEPHERD'S CROOK COTTERS—won't shake loose.
- DOUBLE BOXING—most effective in the field.

The SIE® Compressor Start Unit

. . . makes full pipeline automation as close as tomorrow!

Start now to provide full automation of pipeline control systems by installing the SIE Compressor Start Unit . . . the basis of tomorrow's completely automatic, and today's semi-automatic, operations. *Right now* the SIE Compressor Start Unit offers these important advantages in daily operation:

- Realize greater throughput and increase employee efficiency by automating this vital phase of compressor station operation.
- Handle remote starting and receive immediate visual signals indicating compressor malfunction.
- Eliminate human error by handling entire compressor starting sequence automatically.
- Addition of an SIE Computer Controller will provide full compressor station automation.

Ask SIE for complete information on SIEMARC (SIE Monitoring and Remote Control) to learn how immediate installation of the Compressor Start Unit will advance the date of full automation of your pipeline system, and increase station efficiency in the meantime.

Industrial Instrumentation for Industrial Progress

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS CO.

P.O. Box 13058 2831 Post Oak Rd. Houston 19, Texas

238 58

When pressures run HIGH

Your Well Is Safe With

RECTORHEADS

the head that seals with the Ring-of-Steel

More than 125,000 Rector casing head installations prove that you can forget about pressure leaks when your well is equipped with Rectorheads. For working pressures to 15,000 psi . . . regardless of temperature extremes . . . the Rector ring-of-steel provides a lifetime seal.

There is no resilient packing to flow under pressure or deteriorate from heat or time. The casing is welded to a steel ring that fits in a precision ground seat. There is no stress on the weld when the flange bolts are tightened. A steel API ring gasket completes the permanent, maintenance-free seal.

For well safety and long range economy, specify RECTORHEADS . . . now in sizes through 20". Order from your favorite SUPPLY STORE.

RECTOR WELL EQUIPMENT COMPANY INC

MAKING THE OIL INDUSTRY SAFER

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

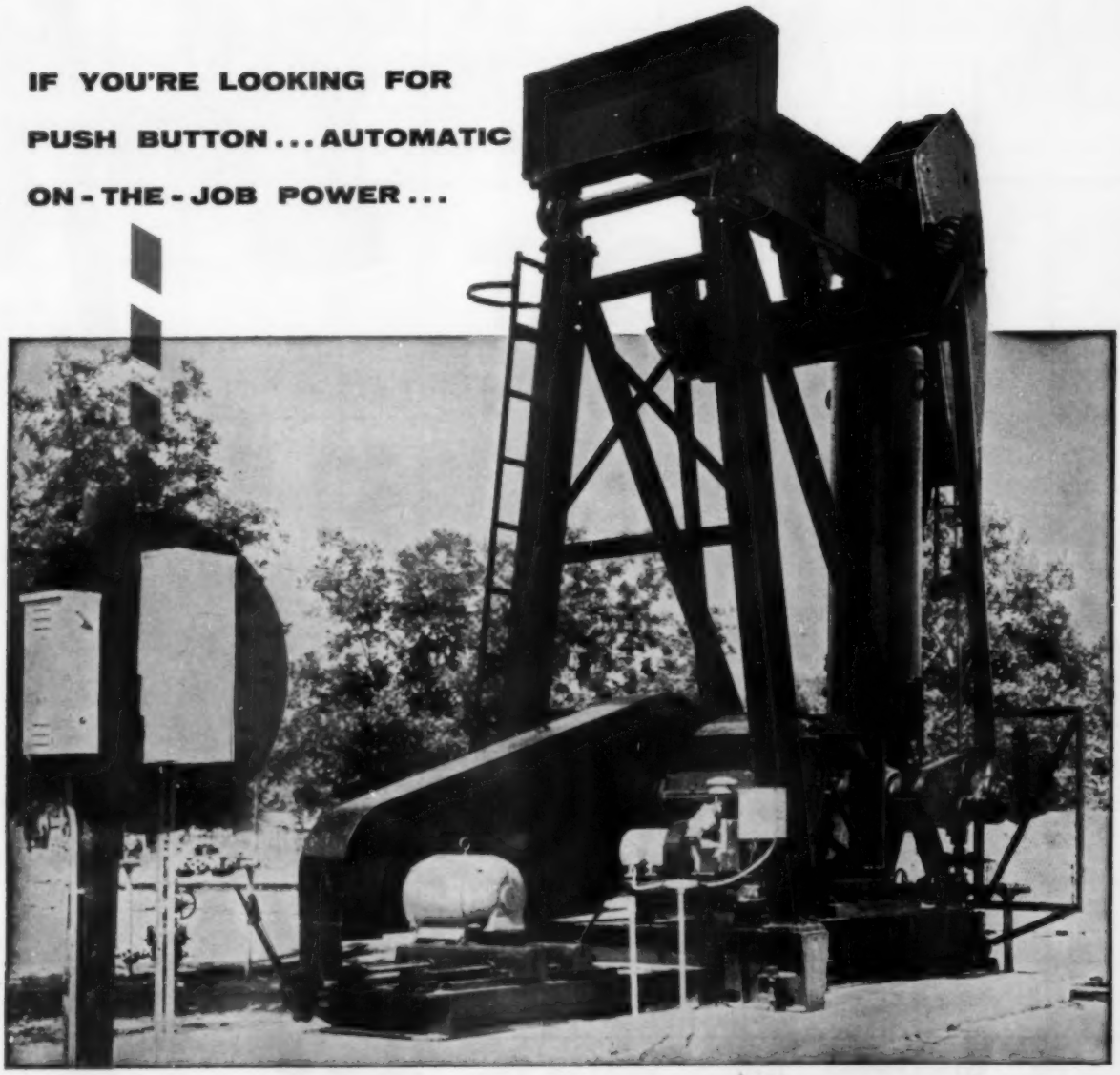
Houston Plant: 2215 Commerce St.

EXPORT REPRESENTATIVES: Continental Supply Company • Mid-Continent Supply Company • Oil Well Supply Company

IF YOU'RE LOOKING FOR

PUSH BUTTON... AUTOMATIC

ON-THE-JOB POWER...



Be a bit shrewder . . . use ELECTRIC POWER

Automation is the key word in more efficient and progressive management today. And when you think of *automation* you must associate it immediately with UTILITY ELECTRIC POWER. Only UTILITY ELECTRIC POWER provides the complete, fully automatic features of automation in oil field production. The evidence is so impressive in favor of UTILITY ELECTRIC POWER that all companies – who consider themselves progressive – will want to know how they can benefit from this modern, efficient power. Call the sales engineer of your Utility Electric Service Company for complete facts.

I'm LCP – Low-Cost Power on the Job 24 Hours Daily

PETROLEUM ELECTRIC POWER ASSOCIATION

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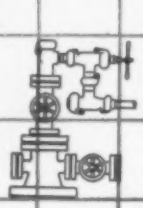
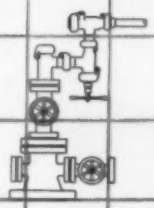
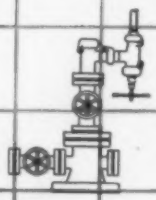






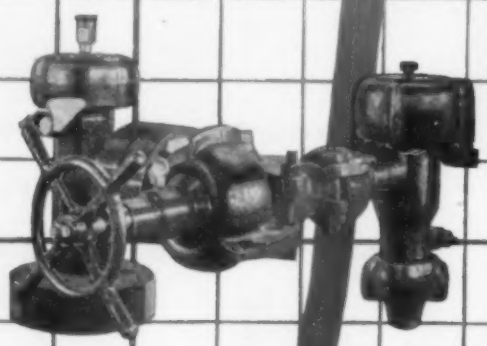
UNIBOLT

flow manifolds

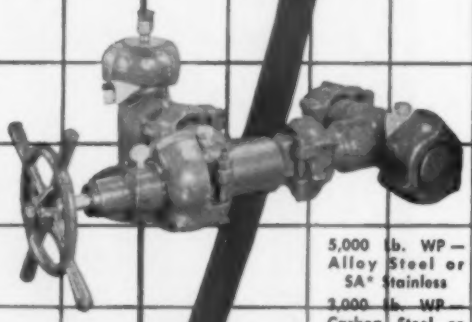
fit your pressures as well as your pocketbook

These are the Christmas tree manifolds that are custom-built to any operator's flow control needs, but at no premium in price. Unlike manifolds of fixed design, UNIBOLT permits complete flexibility in arrangement of its units. Components may have threaded, flanged or UNIBOLT connections. They may be of malleable, regular steel, alloy or SA* stainless, depending upon pressures and service. The chokes may be adjustable or positive with interchangeable flow-rated beans or X-beans. Tee type for single wing or cross type for double wing trees are available. Select exactly what you need for the well. Later on you may salvage the entire manifold as a unit or as individual parts for use elsewhere. By any yardstick, UNIBOLT Flow Manifolds give you far more desirable features . . . at a reasonable cost.

*Special Analysis

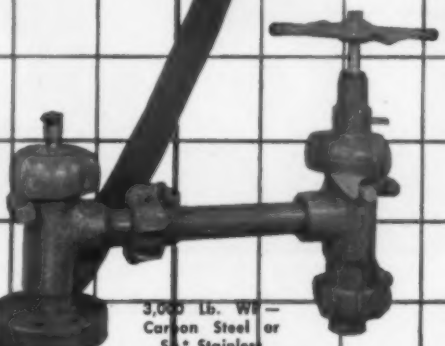


10,000 Lb. WP — Alloy Steel or SA* Stainless



5,000 Lb. WP — Alloy Steel or SA* Stainless

3,000 Lb. WP — Carbon Steel or SA* Stainless

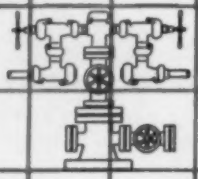


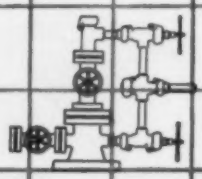
3,000 Lb. WP — Carbon Steel or SA* Stainless

5,000 Lb. WP — Alloy Steel or SA* Stainless

3,000 Lb. WP — Carbon Steel or SA* Stainless

5,000 Lb. WP — Alloy Steel or SA* Stainless





THORNHILL
P. O. BOX 1184

CRAVER CO.
HOUSTON, TEXAS

World's Deepest Well uses LeBus Counterbalance Spooling

"Counterbalance Spooling in my opinion is the greatest improvement in wire line spooling. We are completely satisfied with the results of our Counterbalance Spooling System on Rig 25,"

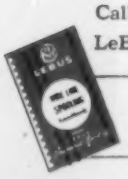
Says **G. G. Jordan**
Richardson - Bass Rig No. 25

Drilled the World's Deepest Well, Richardson Bass, John W. Mecom, Freeport, Sulphur Co. No. 1-L Humble L L & E State lease 2414. This famous rig, a National 34-10FE, equipped with LeBus Counterbalance Grooving has a drum size of 28¾" dia. by 39" long using one and three eighths inch wire rope six layers spooled with ten lines strung up. This same rig now drilling in the same area on a repeat performance.

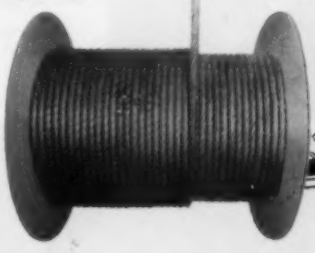
This example is typical of worldwide acceptance of LeBus Engineered Spooling. Whether it's the world's deepest well or an average drilling job, there is a LeBus Spooling System to meet your requirements. LeBus Counterbalance Spooling is recommended where heavy loads are raised and fast drum speeds are required. The result is absolutely perfect spooling . . . less vibration, and line wear, no scrubbing and no cutting in. Saves you thousands of dollars in manhours, hoisting time and wire line!

Call LeBus for details on Engineered Spooling . . . LeBus International Engineers, Inc., Longview, Texas.

Patent Nos.: Counterbalanced Spooling, Nos. 2,734,695; 2,732,150. Controlled Parallel and Helical Spooling, Nos. 2,708,080; 2,620,996. Appli. of grooving, Nos. 2,599,926; 2,204,938. Removable End Fillers, No. 2,216,819. Other patents pending.



Write for new 4th Edition of LeBus Wire Line Spooling Handbook . . . just off the press!



Lebus International Engineers, Inc.

LONGVIEW, TEXAS

LEBUS

LEBUS . . . WORLD HEADQUARTERS FOR *Engineered Spooling* COUNTERBALANCE - PYRAMID - HELICAL

SERVCO PILOT MILL

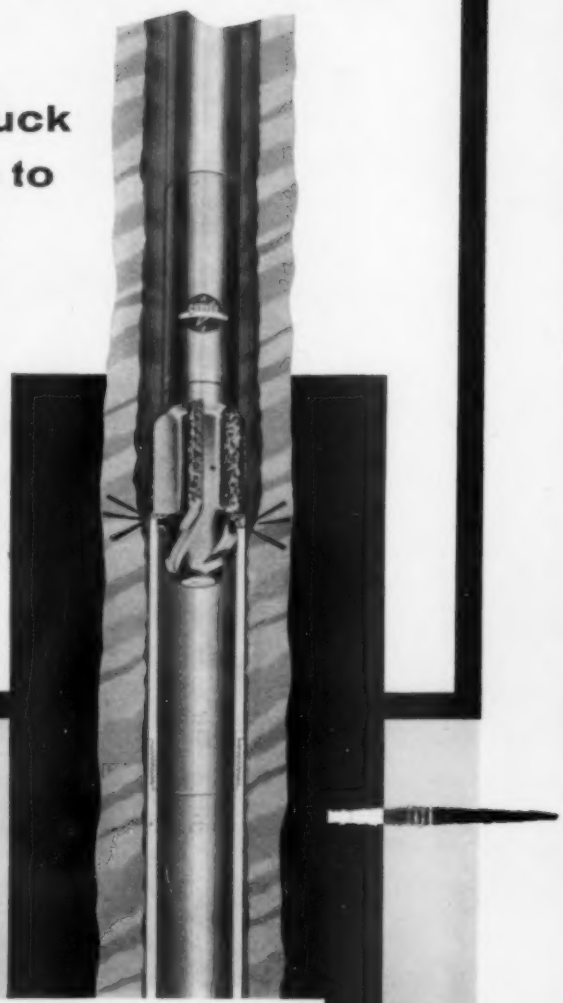
reduces 202 feet of stuck 7", 26#, N-80 wash pipe to 5,252 lbs. of shavings

in 19 hours!

New Servcoloy* dressing material has completely changed thinking in downhole milling operations!

Until recently few drilling contractors ever considered milling up stuck wash pipe. Now, however, they are doing it regularly and at phenomenal milling rates... using Servco Pilot Mills dressed with Servcoloy. No longer is it necessary to inside cut, run spears and jars. All you need to do the job quickly and efficiently is a Servco Pilot Mill and operator. This revolutionary new tool not only mills wash pipe, but also safety joints, cross over bushings and rotary shoes.

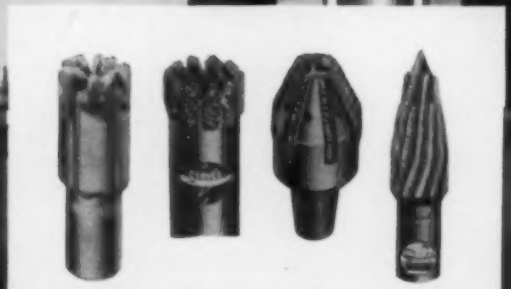
*Patent Pending



ACTUAL JOB DATA WHERE SERVCO PILOT MILLS WERE USED...

Csg. Wt. & Grade	Total Footage Milled	Milling Time Hrs.	Min.	Avg. Footage Milled per Hr.	No. Mills Reqd.	Depths
7⅝" 33.70# N-80	110.5*	53	05	2.1	4	Below 12,500'
7⅝" 29.70# N-80	103**	28	07	3.6	2	Below 13,000'
7" 26# N-80	82	14	40	5.8	2	Below 10,000'
7" 26# N-80	202***	18	48	10.6	2	Below 14,000'

*Includes milling bottom half of safety joint and cross over bushing.
**22° angle directional hole.
***Includes milling rotary shoe.



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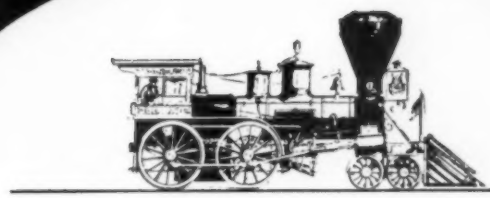
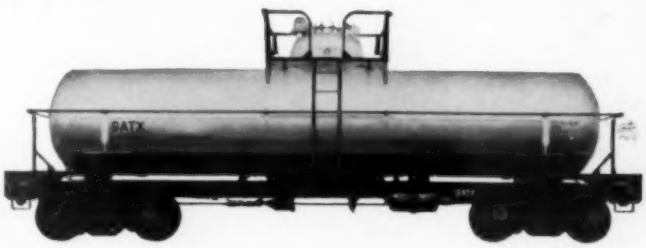


museum pieces are for museums

In 1869, this locomotive was the last word. Today, it is a museum piece.

Not so, your product. If it were, you'd be in the museum business or out of business entirely.

But, if you ship a liquid in bulk, what about the package—the car in which your product goes to market?



Packages are for selling—whether they are on a shelf or on a railway siding. Your product deserves the best package you can find for it.

If your product is a liquid shipped in bulk, GATX builds or can build just the package for it—a tank car that protects your shipment and promotes your good name.

GATX operates the cars for you, knows where they are, keeps them on the move and maintains a nationwide network of shops for their service and upkeep.

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"Reed bit quality was best in 1933 and it's best today . . . thanks to Reed research"

The man talking is I. N. Tower, a specialist in heat treating. He speaks with the authority of 25 years experience with Reed—a period during which heat treating, to increase durability and dependability of rock bits and other oil tools, has truly come of age.

Heat treating at Reed today includes many operations—each an exacting process arrived at through exhaustive metallurgical research.

Here Mr. Tower describes an important heat treating operation—the carburizing process which will be applied to the Reed Y Bit lugs you see in the foreground. The man listening is his son I. N. Tower, Jr., himself a veteran of 15 years at Reed, who welds lugs like these together to make bodies for Reed Y Bits.

Mr. Tower has seen Reed research in metallurgy pace the industry—from "eye ball" control to precise metallurgical specifications—from the first unitized rock bit to today's Y Bit.

Making use of the most up-to-date facilities, Reed's advanced heat treating methods, applied by skilled, experienced technicians like I. N. Tower, build extra quality into every Reed product you use.

Modern methods, experienced men, and untiring research—these are vital factors contributing to the unfailing high standard of Reed quality. That standard, today exemplified by the Reed Y Bit, remains unexcelled.

REED ROLLER BIT COMPANY • Houston 1, Texas

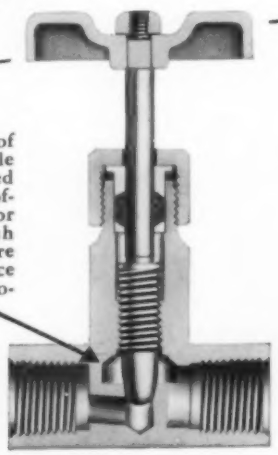
GULF COAST, MID-CONTINENT, ROCKY MOUNTAIN AND CANADIAN DISTRIBUTOR FOR MARTIN-DECKER PRODUCTS

REED Y BITS

Heat Treat Leadman I. N. Tower, shown talking with his son, has been with Reed 25 years. His son, welder I. N. Tower, Jr., has been with the company 15 years.

MAXIMUM WORKING PRESSURE
10,000 PSI
for water, oil or gas

- Body and stem guide extra heavy bar stock fused into one piece.
- Valve stem 416 stainless steel.
- Packing special one-piece "Marpak" moulded ring.
- Bodies marked in accordance with MSS regulations.



ONE PIECE

The stem guides of conventional needle valves are screwed into bodies—this often causes leakage or blow-outs. Marsh Needle Valves are fused into one-piece by exclusive "Conoweld" process.

The Ultimate in Needle Valves

Here is one of the crowning achievements of Marsh research, design, and manufacturing skill. It is the first needle throttling and shutoff valve to combine *all* of the qualities called for today in this highly critical and ever broadening field.

It is a valve that has strength and safety to spare . . . rated for pressures up to 10,000 psi—equally efficient in the lower ranges. A product of Marsh instrument-making and valve manufacturing experience, it combines instrument-like precision with the ruggedness that distinguishes all Marsh valve specialties.

The illustrations tell the story of new thinking; new standards. Body and stem-guide are machined from extra-heavy carbon steel bar stock. Still greater strength and rigidity are achieved by fusing the stem-guide into the body. The complete fusion of guide and body is accomplished by the exclusive Marsh "Conoweld" process.

There are two big advantages to this one-piece construction: (1) It eliminates the danger of unscrewing the valve from the body when opening—a frequent cause of leakage, even dangerous blow-outs (2) It permits perfect line-up of threads and seat. As a result, Marsh valves are easier to operate even at high pressures.

The precision-machined stem is 416 stainless steel. Stem threads are fine pitch for extra strength and fine, controlled regulation. Notable advancements are special "Marpak" one-piece, non-binding longer-lasting packing; deep thread chambers, keeping inlet and outlet piping away from ports and contributing excellent flow characteristics. Entire packing nut and packing gland are electro-zinc plated, preventing corrosion and giving the valve a handsome, plated exterior. The rugged malleable handle is finished in heavy baked enamel.

The new needle valve line includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾" and 1". Also globe and angle valves with male inlet and female outlet in sizes ¼" and ½". *Complete stock carried at our Skokie, Illinois factory and also at our branch plant in Houston, Texas.*

Write today for catalog giving complete details.

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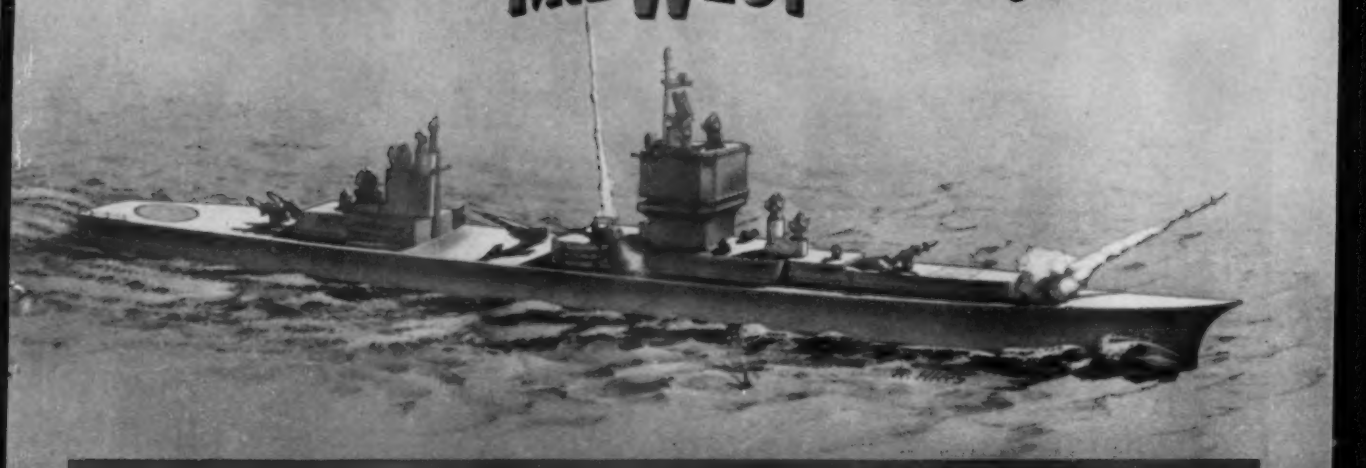
"THE STANDARD OF ACCURACY"

World's First Nuclear-Powered Surface Ship will have MIDWEST Welding Elbows



U. S. Navy's guided missile, nuclear-powered cruiser "Long Beach"

OFFICIAL U. S. NAVY PHOTOGRAPH

Special Fittings are "ROUTINE" for Midwest

Stainless Steel
S.R. 102° Elbow
with tangent on one end.

Stainless Clad
S.R. 39° Elbow
with tangent on one end.

Stainless Steel
S.R. 90° Elbow
with tangent on both ends.

Special Elbows (dimensions, tangents, wall thicknesses and materials) are easily provided by the exclusive and flexible Midwest method. Elbows are available in any material that can be secured as plate, which also means better delivery. Closer tolerances are inherent in the Midwest process. Quality control always exceeds Code requirements.

Shown here are three of the special stainless steel and stainless-clad elbows made by Midwest for the "U.S.S. Long Beach". All reactor coolant piping must meet extremely rigid specifications because of the difficult service. Special quality controls, such as ultrasonic testing, intergranular corrosion tests, dye checking, radiography, and ring flattening tests were used one or more times at various stages of manufacture from the raw material to the finished fittings. Special quality standards for soundness of metal, "water clear" welds, dimensional accuracy, and surface finish were satisfied.

The U. S. Navy's first nuclear-powered surface ship, the "Long Beach", will introduce a radically new concept in defense capabilities. She will operate offensively and independently of other forces under conditions of both nuclear and non-nuclear warfare against airborne, surface or under-sea opposition. In addition to equipment and weapons for detecting and destroying enemy submarines, she will carry the Navy's modern guided missiles.

The piping for the atomic reactors being designed and developed by the Westinghouse Electric Corporation will use a large number of special heavy wall stainless steel Midwest Welding Elbows. This is not the first atomic project for which Midwest Welding Fittings have been used. In fact, when the nuclear propulsion program first began, Midwest furnished special welding fittings for the "Nautilus" prototype installation at Arco, Idaho.

Whether or not you are concerned with nuclear power, Midwest Welding Fittings (both stock and specials) will do a better job for you. Ask your Midwest distributor or write us for Catalog 54, which tells you why.

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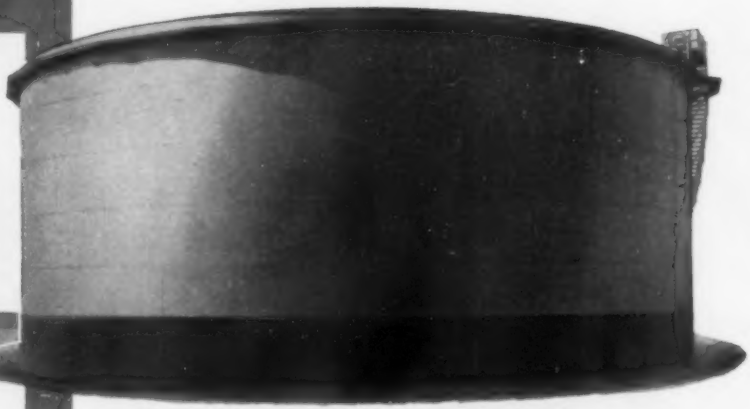

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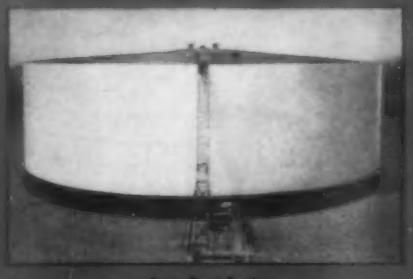

Cone Roof Tanks

The universal acceptance of Hammond-built equipment is the result of more than half a century of experience in the design, fabrication and erection of storage tanks, process vessels and steel plate construction for the petroleum, chemical and allied industries, and for water supply.

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High Output at all Operating Speeds

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The reputation of Bendix* in the field of ignition is truly unmatched. From the history-making flight of Lindbergh to today's fastest jets, the aviation industry has always looked to Bendix for the latest and most efficient ignition equipment. Likewise in industrial ignition Bendix has set new standards of performance in applications ranging from small outboard motors to the largest industrial engines.

That's why the introduction of this new Bendix S-400 series of magnetos is of such great importance. Here is a magneto that incorporates all of the improvements and refinements of modern ignition design.

Built to aircraft precision standards the new S-400 series is especially rugged so as to deliver trouble-free operation during long periods of service.

It is available in both four- and six-cylinder flange-mounted models in weatherproof, unshielded and radio-shielded versions.

For the important jobs where continuous top performance is a must, the new Bendix S-400 series magneto is the logical choice. Why not write today for complete details and specifications of this modern industrial engine magneto.

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Management's attitude toward service is important. And the entire management of Stewart & Stevenson is concerned and working if your engine is down . . . concerned to the point that they will leave absolutely no stone unturned to get it back on the job in the shortest possible time.

"Engines are only as good

Buying an engine is a big decision. And equally important is where you buy the engine. It is the cost of operating your engine in the long run (not first cost) that finally determines what you pay for it.

Any kind of engine . . . regardless of the conditions under which it operates . . . will need service someday. Then what? That's when the service attitude of the company you bought the engine from gets the acid test. More important, what happens to you? Down-time is expensive.

At Stewart & Stevenson, we look at engines and service from a realistic point of view. We recognize the fact that every engine is likely to need service. We know that an engine owner loses money every minute that his engine is not operating.

To serve you best, we have set up the largest distributor parts and service organization in the Nation. These facilities have stood the test of time and have actually saved engine owners thousands of dollars.

THE WORLD'S LARGEST DISTRIBUTOR OF

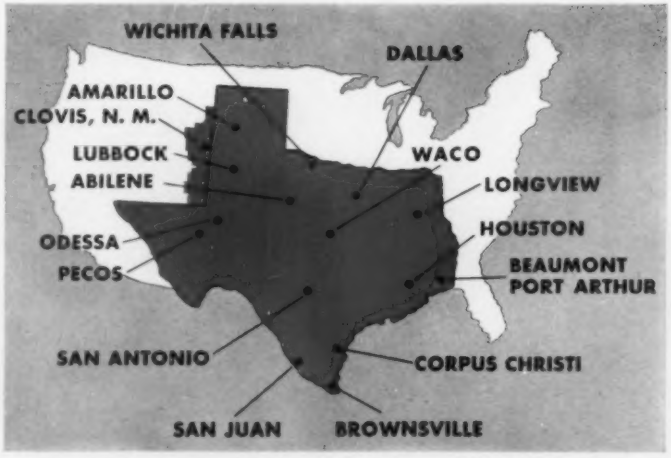
A STATEMENT OF FACTS AND POLICY FROM THE WORLD'S LARGEST DISTRIBUTOR OF DIESEL ENGINES

as the service you get"

Every Stewart & Stevenson service man has a direct line to our management for on-the-spot decisions on replacements and warranties. There are no unlisted telephone numbers.

Stewart & Stevenson has become the world's largest distributor of diesel engines because of these facts: we assume full responsibility for your job . . . we guarantee it to perform as specified . . . we maintain the Nation's largest distributor stock of parts and 24-hour service usually not more than two hours from your installation . . . we have a backlog of experience gained through thousands of engine applications in practically every conceivable industry.

We believe that when you consider all these advantages . . . plus the Stewart & Stevenson management attitude toward service . . . you will agree that it's best to do business with an organization that will work as hard as you do to keep your engines operating at peak efficiency.



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DIESEL ENGINES

Valves for the Petroleum Industry

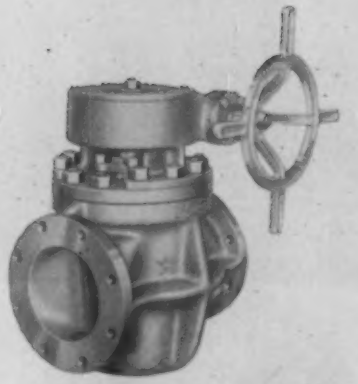

Fig. 3059G—300-Pound Steel Lubricated Plug Valve. Bolted gland type, gear operated. Sizes 6" to 12".

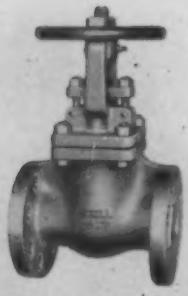

Fig. 2467—Small 300-Pound Stainless Steel O.S. & Y. Gate Valve.

Fig. 6061—600-Pound Steel Swing Check Valve.

Fig. 2201—175-Pound W.O.G. Semi-Steel Lubricated Plug Valve. Single gland type.

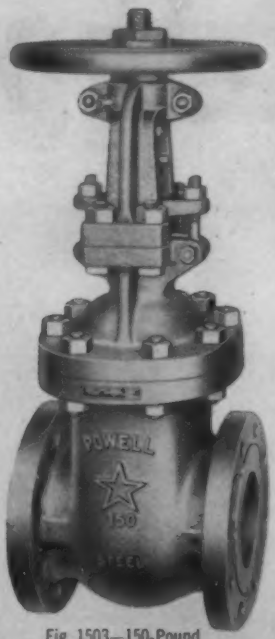

Fig. 1503—150-Pound Steel O.S.&Y. Gate Valve.

Fig. 375—Bronze Gate Valve for 200 pound W.S.P. Union bonnet, inside screw rising stem.

POWELL...

world's largest family of valves

FOR EVERY FLOW CONTROL PROBLEM Powell offers more kinds or types of valves, available in the largest variety of metals and alloys, to handle every flow control requirement. Your local valve distributor will be glad to tell you all about them. Or write to us for the full facts.

THE WM. POWELL COMPANY • *Dependable Valves Since 1846* • **Cincinnati 22, Ohio**

Ten Ingersoll-Rand PJVG gas engines provide low maintenance and high availability in flood pump service

These ten Ingersoll-Rand PJVG gas engines are driving high pressure water flood pumps at Gulf Oil Corporation's North Ward-Estes Unit, Wickett, Texas. They have been in continuous service since December, 1954, and service attention has been held to a very satisfactory minimum. Three additional units are on order.

These 295-hp four-cycle, V-angle engines include automatic speed control for varying water volume and pressure.

For service-proved dependability in round-the-clock service—with smooth control and long-run economy—look into the advantages of Ingersoll-Rand 4-cycle V-angle gas engines. They are available in sizes from 220 to 2000 hp. Ask your I-R representative for complete details.

4-CYCLE

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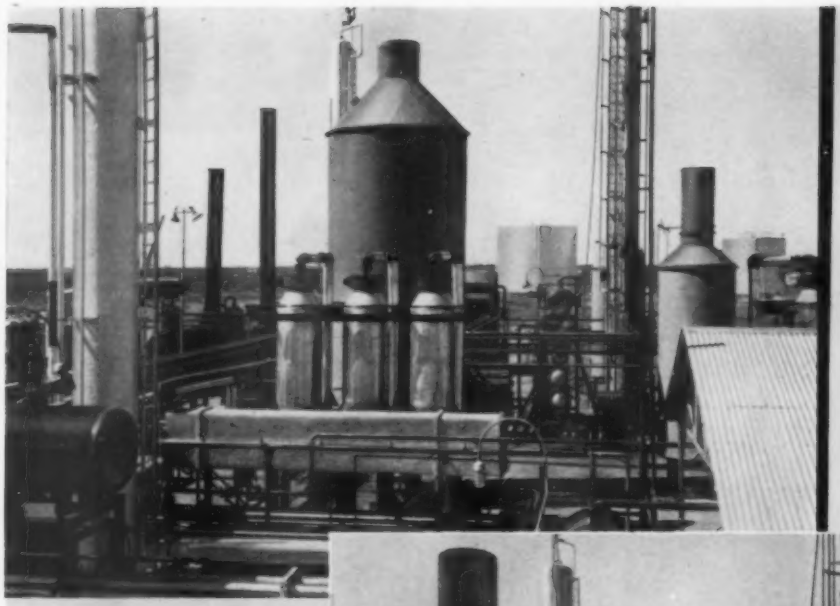
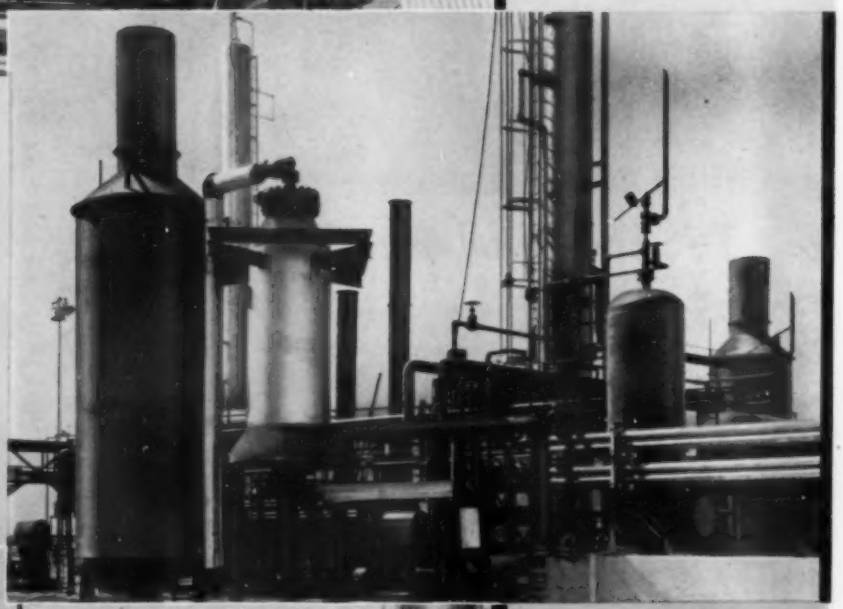
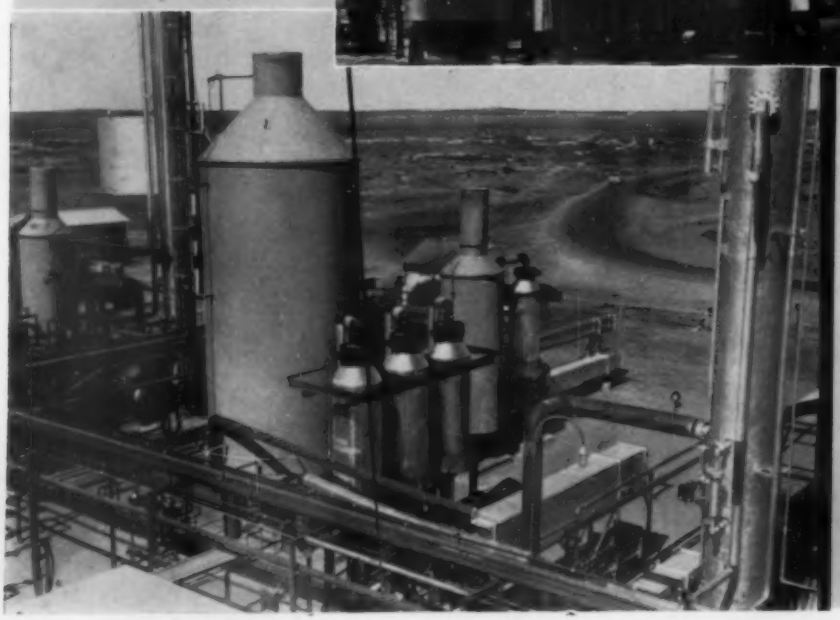
COMPRESSORS • GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS
PUMPS • CONDENSERS • ROCK DRILLS • VACUUM EQUIPMENT



The vessel in the center is a gas fired updraft heater serving our Platforming unit. Three smaller vessels immediately in front of the heater are the Platforming reactors.

The vessel on the left is a heater and the structure on the right is a reactor of the UOP Unifining unit used in preparing the feed for our Platforming unit.





Shown here is the circular updraft heater and three reactors of our Platforming unit. Here you have an excellent view of the great New Mexico desert.

Famariss Produces High Octane Products From Platforming-Unifining Units

By Walter Famariss, Jr.
President
Famariss Oil and Refining Company
Hobbs, New Mexico

We have perhaps one of the smallest refineries marketing a finished product on the local level. Regardless of our size we are aware of our responsibility to offer customers a high octane number product consistent with the demands of today's high compression automobiles. Our search for a process to give us a high quality product plus low initial and operating costs led us to the Platforming process. In 1955 we placed on stream a 750 B/SD Platforming unit. To prepare the feed for the Platforming unit a 1000 B/SD Unifining unit was also installed.

Walter Famariss, Jr.

Famariss Raises Octane Number

With the addition of these units we were able to increase the octane number of our straight run gasoline from 68 RON to 97-98 RON giving our customers a quality product meeting the highest standards in our area. These new units enabled us to boost our total refinery throughput to 2,250 B/SD. Presently we are planning to expand our capacity 50 percent. Catalytic Cracking and additional Unifining facilities are processes being considered. The additional Unifining unit will be used for the treating of intermediates permitting us to enter new markets, thus substantially increasing the value of these products.

Growth Necessitates New Facilities

Perhaps you would be interested in our early growth and problems prior to the installation of the Platforming-Unifining units. Famariss Oil and Refining Company was formed in 1947 as an outlet for the marketing of a small amount of crude I was handling in this area. In 1949 we leased a small refinery at Monument, New Mexico, and in August we started operation of the refinery processing 450 barrels of oil per stream day. Market demands quickly exceeded this production. We therefore gradually increased production to the refinery's apparent maximum limit of 750 B/SD.

During this period all of our production was sold to other refineries for further processing. In 1951 we completed facilities for adding tetraethyl lead and the consequent tankage to enable our refinery to manufacture finished gasoline. We were then able to sell our motor fuel locally. So successful was our operation that in 1952 we purchased the Monument refinery from the leasor. We dismantled the refinery and moved the various structures and equipment one-half mile to a new location on our property. In just 90 days we were once again in production; this time throughput was increased to 1,200 B/SD.

UOP Aids In Solution Of Process Problems

But soon again we faced the problem of increasing production to meet the rising demands of our marketing area—an area which includes all of New Mexico, West Texas and the eastern portion of Arizona. Yes, demand for our motor fuel was increasing but so were compression ratios of automobiles requiring a higher and higher octane number gasoline. This can be an excessively costly problem for a small refiner. In this regard we met with engineers of Universal Oil Products Company, licensor of petroleum refining processes. UOP analyzed our needs in view of our economic and financial framework and suggested the Platforming unit—with a Unifining unit to prepare the feed stock for more efficient processing in the Platformer. We are happy to report that this was an ideal solution. Originally designed for research octane number production of 93.5 we were able to produce a gasoline of 97-98 research octane number by increasing the severity rate somewhat, yet allowing for further octane number increases if desired.

In Operation

The charge to the combination Platforming-Unifining unit—60% locally produced condensate and 40% straight-run gasoline—is prefractionated to produce a 150-400° F., 56° API heart cut. This is the liquid portion of the feed to Unifining. Excess hydrogen (from Platforming) joins this stream, is preheated, brought to reaction temperature in a fired heater, then enters the reactor and subsequently, a high pressure separator. Here any excess hydrogen is vented to the fuel gas system. The liquid product goes to a low pressure separator and thence to a stripper where the H_2S is removed overhead. The bottom product is the Platformer charge.

Our company is marketing three grades of gasoline—premium, regular and government grade. Bottoms from the prefractionator are being marketed as sand fracturing oil, which is finding increasing usage in revitalizing low producing oil wells.

Here at Famariss Oil and Refining Company we are looking into the future confident that whatever the motor fuel requirements of our customers may be we will continue to produce products meeting the highest competitive standards.

Octane number of straight run gasoline increased nearly 50% for Famariss with UOP Platforming® and UOP Unifining* processes

designed, engineered and licensed by

UNIVERSAL OIL PRODUCTS COMPANY

UOP

30 ALGONQUIN ROAD
DES PLAINES, ILL., U.S.A.

More Than Forty Years Of Leadership In Petroleum Refining Technology

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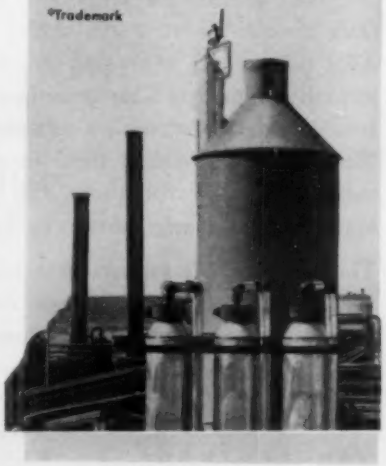
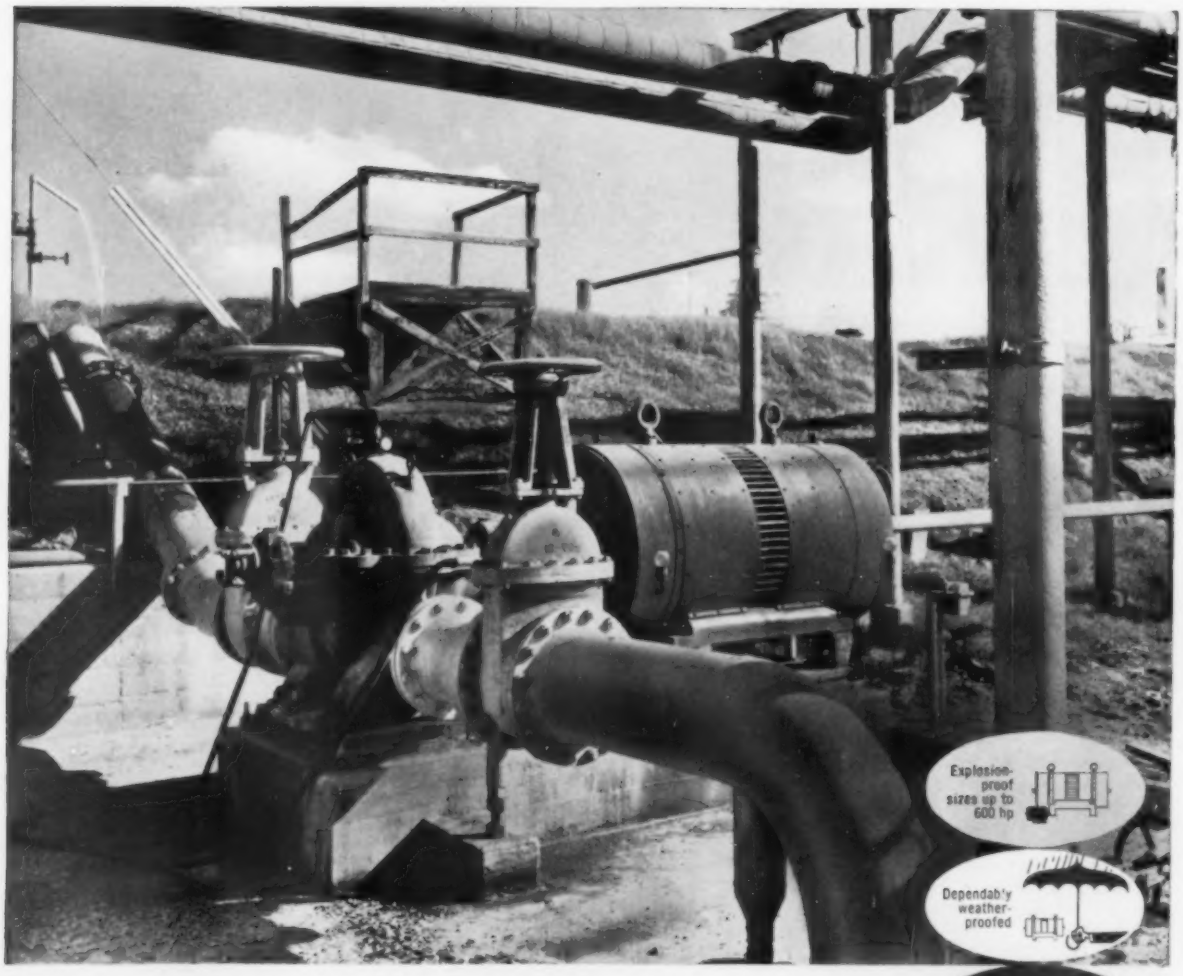




A dependable guard for petroleum outposts

Louis Allis explosion-proof motors need little attention

Once installed in your unattended locations, Louis Allis fan-cooled, explosion-proof motors can be virtually forgotten. They're designed to assure long, trouble-free service with a minimum of attention. That's why you'll find them in countless remote installations, like the above 450 hp pump-motor application at a large refinery in the Southwest.

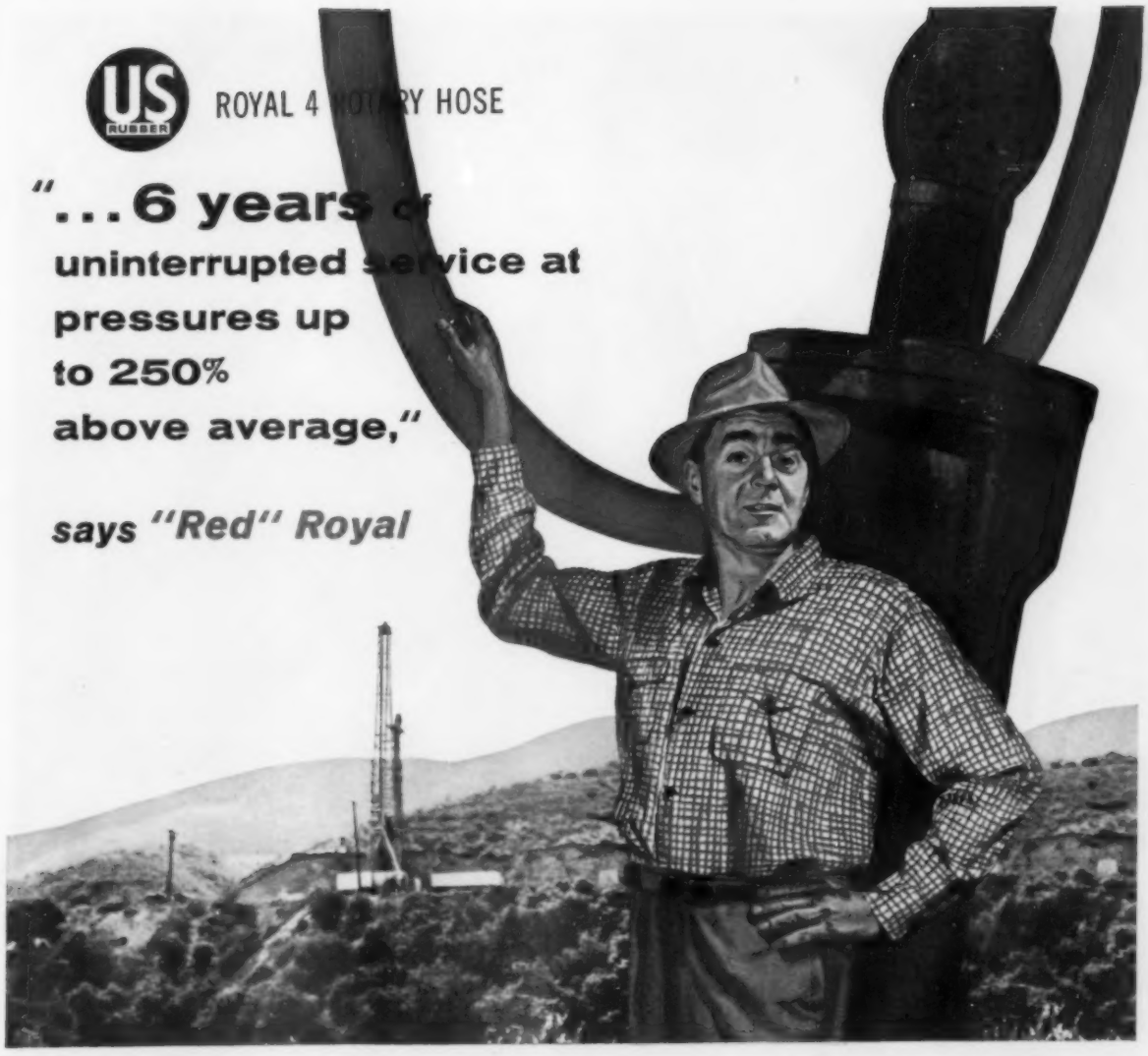
These dependable motors incorporate insulation that resists heat, moisture, and corrosion. What's more, the sturdy completely-enclosed cast-iron housing is perfect protection against rough weather — shrugs off rain or sandstorms with equal ease, and ignores even the corrosive effect of saltwater spray.

Generous bearing sizes and ample provision for lubrication assure minimum maintenance attention and long, trouble-free bearing life.

You will like these motors for remote installations. Ask your Louis Allis District Office for Bulletin 800 — or for engineering assistance. Or write The Louis Allis Co., 449 E. Stewart Street, Milwaukee 1, Wis.

LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE SPEED DRIVES



"Red" is talking about U. S. Royal 4 Rotary Hose performance at Shell Oil Company's field in Ventura, California. This particular hose was installed in 1951. It has handled pressures that often hit 3000 lbs., compared to standard operating pressures of 1200 to 1400 lbs.

What's more, this Royal 4 is one of the most traveled rotary hose in the West, taking all the extra punishment involved in moving around the rough California terrain. Yet, from the day it was put on its first rig, *this Royal 4 has never caused one minute of downtime.*

The hose has drilled over 300,000 feet so far, most of the time carrying oil-base mud. The Ventura field is one of the deepest in California and requires the best hose there is. And that's U. S. Royal 4 Rotary Hose—the hose that takes the highest pressures delivered by today's pumps, with a margin to spare for the pumps to come.

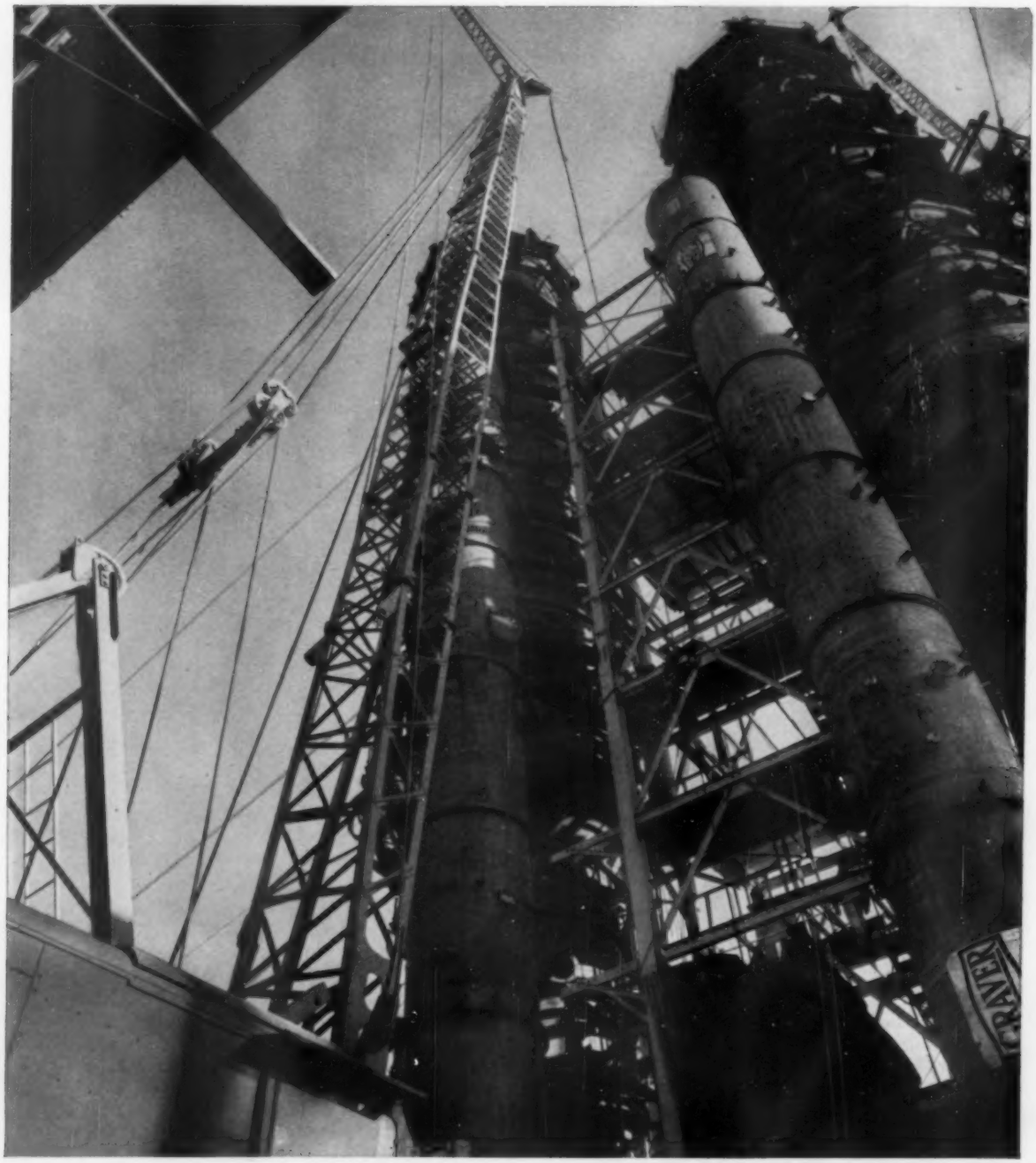
So don't tie up money in stand-by hose . . . avoid downtime needed for switching. Use Royal 4 all the way from spud to pay.

Available in all fields at supply stores.
(In California, contact U. S. Rubber District Office, Los Angeles.)

Mechanical Goods Division

United States Rubber

See things you never saw before. Visit U. S. Rubber's New Exhibit Hall, Rockefeller Center, N.Y.



NEW MONUMENTS TO EFFICIENCY!

These huge stripper columns were produced with typical Graver craftsmanship. Shop fabricated from ASTM A-285 Grade C firebox quality steel, they represent one of many types of processing equipment Graver has been fabricating for 100 years.

1857-1957 GRAVER *Our 100th Year*

Building for the Future on a Century of Craftsmanship in Steels and Alloys

GRAVER TANK & MFG. CO., INC.

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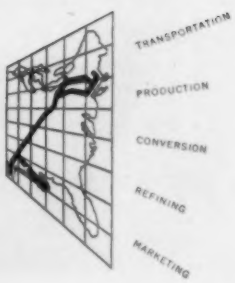
FROM THE GROUND UP...

From gas well to distant city... from wildcat test to service station driveway... Tennessee Gas Transmission Company is active in every aspect of oil and gas.

Our name tells you we transport natural gas... about two billion cubic feet daily, in fact, through 10,000 miles of pipeline in 15 states. Today we also explore for and produce oil and gas from South America to Canada... extract and convert natural gas hydrocarbons ... refine, transport, and market a full range of petroleum products.

Like the industry itself, we are broadening our activities... for ever-wider service to America.



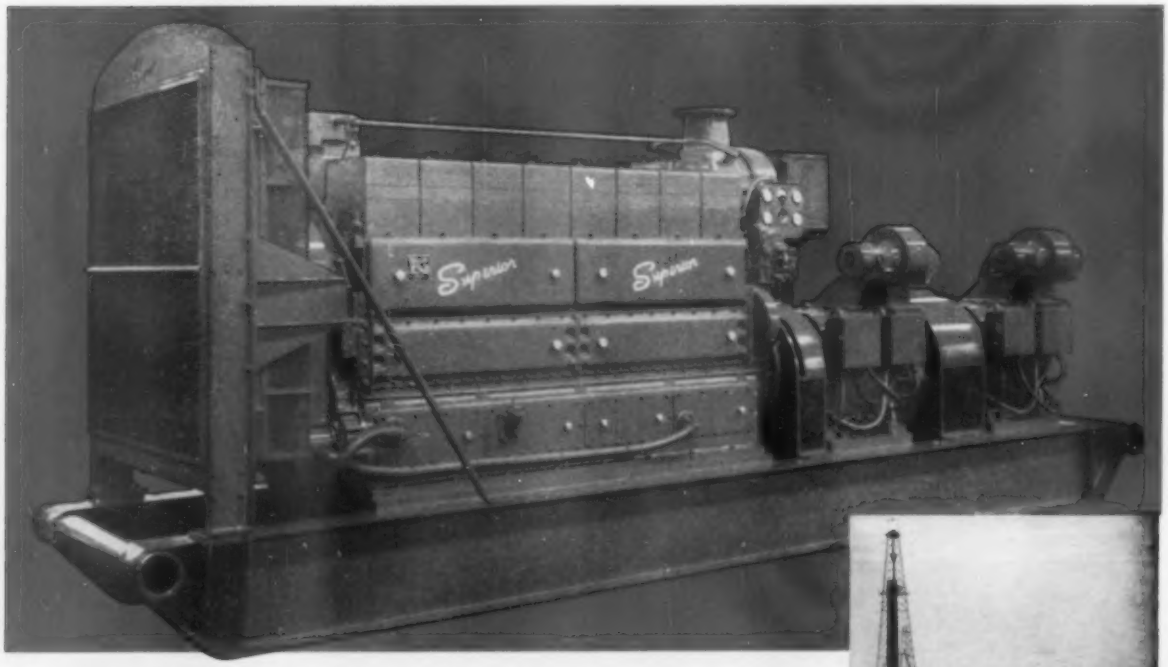
TENNESSEE GAS TRANSMISSION COMPANY

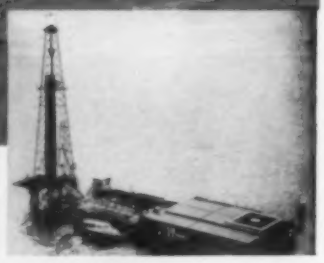
AMERICA'S LEADING TRANSPORTER OF NATURAL GAS

HOUSTON, TEXAS

ESSO Creole Petroleum selects

White DIESEL White's Superior Diesel-Electric





Lighter, extremely simple, more powerful drilling rig power plant!

Creole Petroleum Corporation, a Venezuela affiliate of Standard Oil Company (New Jersey) chose White's Superior Diesel-Electric power for drilling operations on Lake Maracaibo in western Venezuela. The complete power package, including three 900 HP Superior engine-generator sets mounted on the 180′ long by 70′ wide barge, will dependably provide a total of 2700 HP. From simplified controls, the driller can direct 2,000 HP to the platform draw works or 2,300 HP to the mud pumps. White's diesel power concentration achieves simplicity, compactness and light weight. The favorable power to space ratio obtained through electric motors behind the draw works means Creole Petroleum can use a standard size platform and yet have ample power for deep drilling.

Creole's barge power components consist of 3 engine-generator sets, 5 drive motors, and simple controls. White's well known Superior oil field engine and rugged 400 KW generators in tandem make up an engine-generator set. Large drive motors are rated 625 HP continuous and 1000 HP intermittently. Greatly simplified controls allow application of power where required, either to draw works, mud pumps, or to both when pumps and rotary are operating.

White's range of other diesel-electric drilling power packages combines the Superior oil field engine and rugged 300 to 550 KW generators. Largest drive motors are rated 1000 HP continuous and 1250 HP intermittently. All components are stocked, standard production items, ready for prompt delivery.

WRITE TODAY FOR COMPLETE INFORMATION...

White Diesel

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY Plant and General Offices: Springfield, Ohio

Here's Why...

Silicone Insulated Transformers Provide Reliable Power Anywhere

Locate them anywhere near the load —on the floor, a balcony or wall . . . dry-type transformers insulated with Dow Corning Silicones are lightweight, space-saving and easy to install. They fit into any plant layout. And equally important, they cost less to install, less to maintain, far less in the long run!

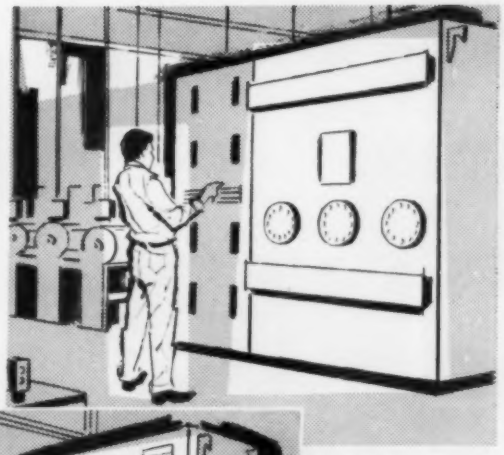
Easy, low-cost installation. Simply connect the necessary leads and throw the switch! Neither sealed nor open type silicone-insulated transformers require costly vaults, barriers or ventilating fans. And they don't contain liquids that can burn, explode or give off toxic fumes. They're completely dry, completely safe.

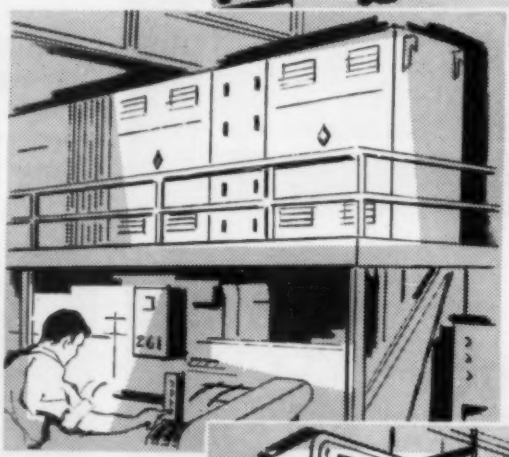
New freedom from maintenance. With no liquids to maintain or toxic fumes to guard against, you install dry-type transformers and virtually forget them. Even in open-type transformers, silicone insulation assures reliable power despite contaminated atmospheres, dust, dirt, moisture or high ambients.

Maximum reliability. Dow Corning silicone insulation has sufficient thermal capacity to handle temporary overloads up to 25% above rated capacity. This extra capacity assures the ultimate in uninterrupted, reliable power for automation . . . continuous processing . . . and all plant functions.

Send today for a list of equipment manufacturers who supply Dow Corning silicone-insulated dry-type transformers.

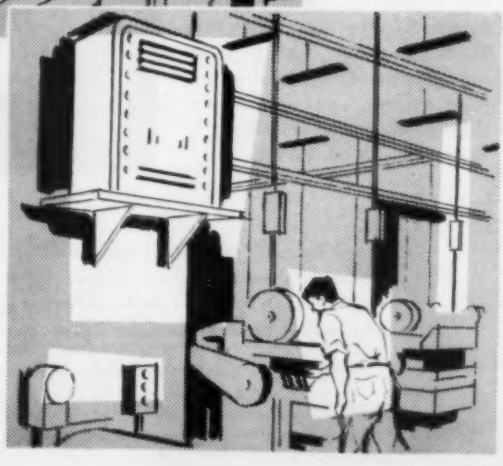
ON THE FLOOR
maximum safety; freedom from maintenance; easy to install





BALCONY
15% lighter than next lightest type; save floor loading

OR WALL
lightweight wall or platform mounted units save floor space



Specify DOW CORNING SILICONES *and Save*

first in silicones

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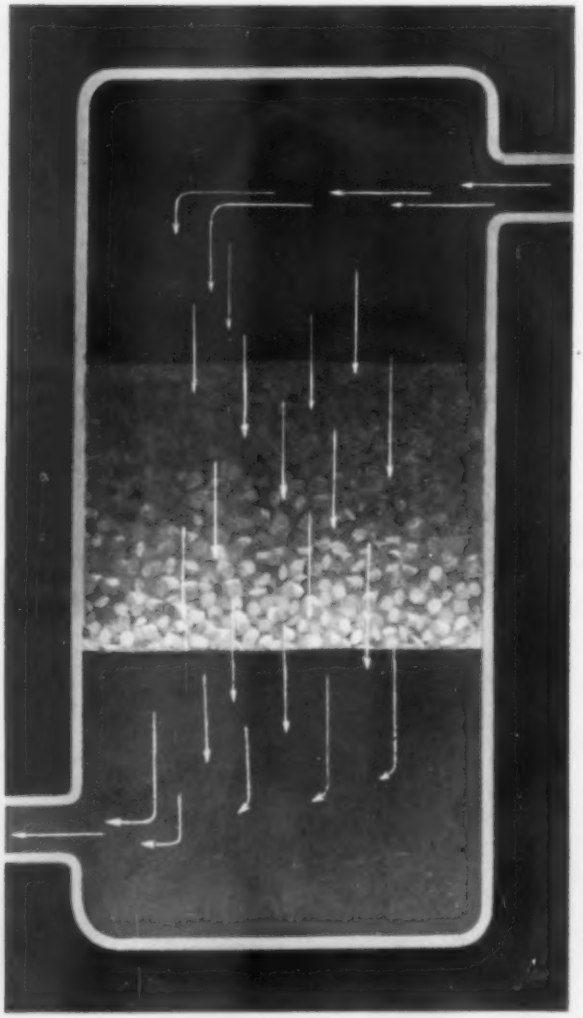

New AERO* HDS-2

Catalyst

Unequaled for Efficient Economical Upgrading of Feedstock

AERO HDS-2, Cyanamid's *new* cobalt-molybdena hydrodesulfurization catalyst meets all the requirements of modern hydrogen treating. Its superior characteristics are evidenced by the improved performance it provides in efficient and profitable upgrading of refinery streams.

Because of the low bulk density and high volume activity of AERO HDS-2, you can maintain throughput rates with 30% less catalyst—or you can increase throughput on the same quantity of catalyst, while operating at a specified treating level. Add, too, the excellent efficiency of HDS-2 in sulfur and nitrogen removal.

Pound for pound, AERO HDS-2 outperforms all other hydrodesulfurization catalysts and is undoubtedly best for *your* process. Your Cyanamid representative will be glad to furnish details. Call or write him today.

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HIGHLY SELECTIVE PLATINUM CATALYSTS

For normal or HDS-upgraded feedstocks, AEROFORM® Platinum Reforming Catalysts provide excellent performance in octane improvement. Good stability and easy regeneration contribute to their low cost-per-barrel.

TOP ANTI-WEAR FOR TOP LUBES

Where *extra* protection is required for engine break-in, AEROLUBE® 93-C concentrated zinc dithiophosphate does the job. Excellent oxidation inhibition and anti-wear properties make it ideal for both initial fill and regular use in premium oils.

The invaluable experience and advice of operating oil men is sought by Cyanamid's field men – is fed into our thoroughly modern laboratories – and results in superior, highly effective Cyanamid products. That is why each is so well suited for its recommended application.

CYANAMID

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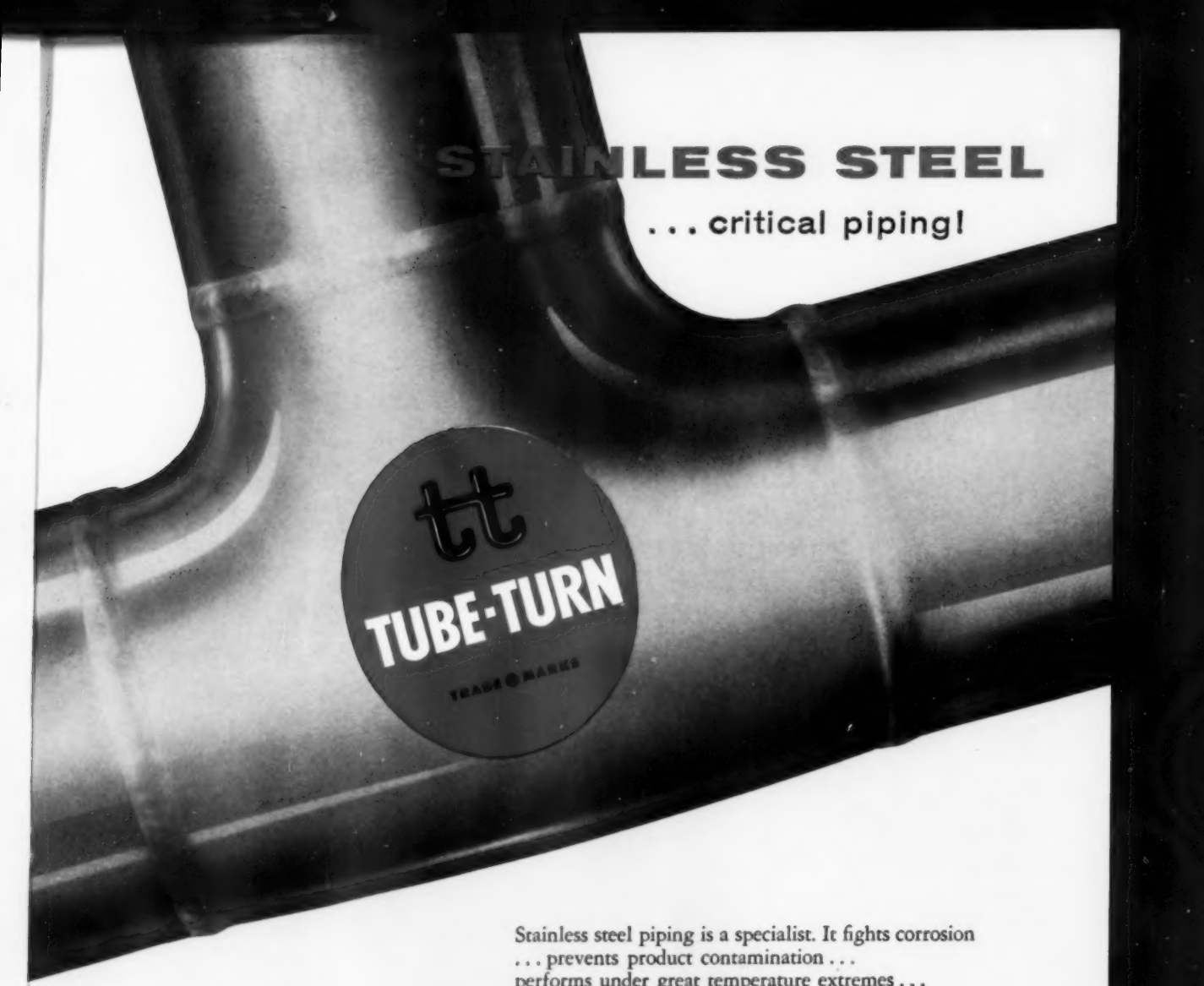
30 Rockefeller Plaza, New York 20, N. Y. · In Canada: North American Cyanamid Limited, Toronto and Montreal



. . . a critical place to safeguard your reputation with "**TUBE-TURN**" products

Stainless steel piping is a specialist. It fights corrosion . . . prevents product contamination . . . performs under great temperature extremes . . . is able to handle dangerous materials safely. Construction and maintenance dollars, often the safety of life and property, and *your reputation* are at stake in the selection of these materials.

When you specify TUBE-TURN* Stainless Steel Fittings and Flanges, you get extra-value features and greater strength at no extra cost. Fittings are marked with *complete* identification. Production procedures and quality control assure conformity to all code requirements.

Your nearby Tube Turns' Distributor can meet *all* your needs in welding fittings and flanges *promptly.*

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YOUR SAFEGUARDS

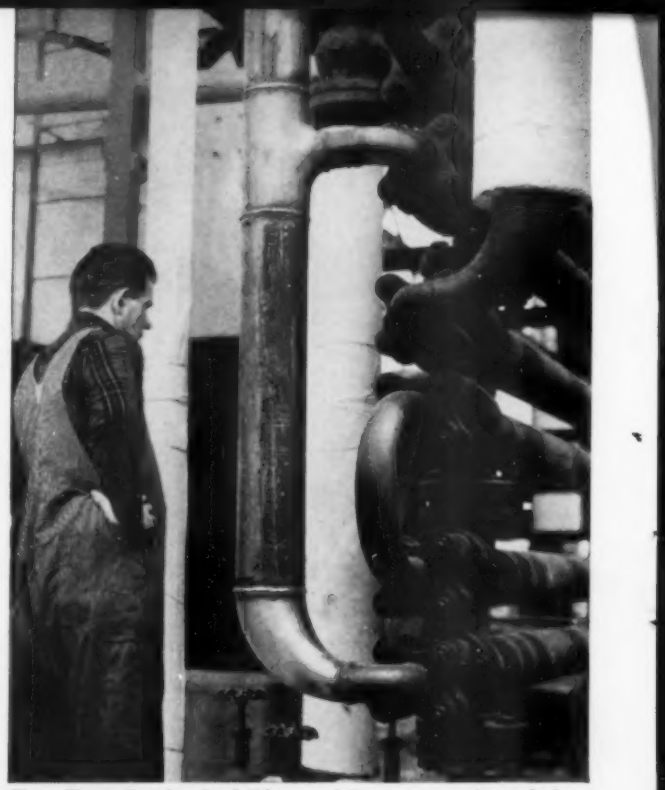
You get these extra values at no extra cost with

TUBE-TURN

Stainless Steel Fittings

- Fittings meet *all* standard chemistry specifications
- Minimum wall thickness of elbows are at least 87½% of nominal
- All fittings meet calculated bursting pressure of matching pipe
- Qualified welders and procedures used where welding is required
- Each fitting properly solution heat-treated
- Each fitting passivated
- Special grades of stainless steel, and all other alloys available

Meet all codes: ASTM A403 (for material and manufacturing procedure); MSS SP43 and ASA B16.9 (for dimensions); and MSS SP25 (marking procedure).



TUBE-TURN Stainless Steel Elbows and Tee in a petrochemical plant.

UNIFORM WALL. Fittings meet ASA standards of 87½% of nominal thickness . . . particularly important for light wall elbows. Many conventional stainless steel elbows are as much as 30% to 40% below nominal at this point of greatest wear. All TUBE-TURN® Stainless Steel Fittings, including tees, match calculated bursting strength of the pipe.

COMPLETE IDENTIFICATION. You *know* this fitting conforms to specified quality because the material type and quality control are fully identified. Manufacturer, size, wall thickness and schedule are also marked as shown on the fitting.

CUTS PURCHASING COSTS. You can order TUBE-TURN Stainless Steel Fittings from your nearby Tube Turns' Distributor . . . on the same order as other types of welding fittings in Tube Turns' line of 12,000 products. Cuts red tape. Saves time. Photo courtesy McJunkin Corporation, Charleston, W. Va.

STAINLESS STEEL CATALOG—Complete information on properties, application, standards, welding procedure and all types of TUBE-TURN Stainless Steel Fittings and Flanges. Mail coupon for your free copy.

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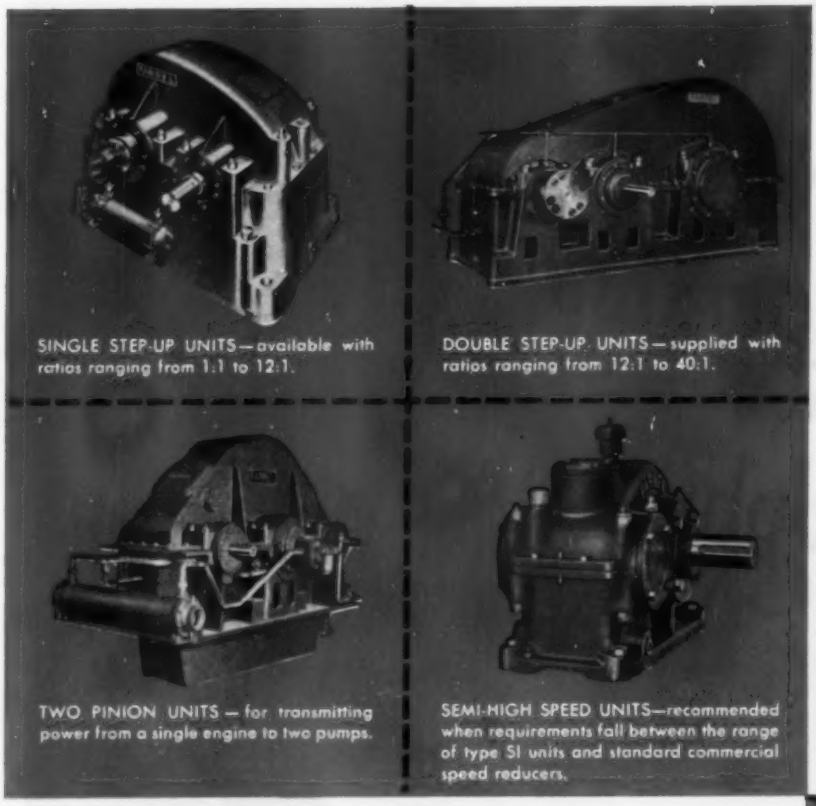
Farrel has the right SPEED INCREASER for the job...



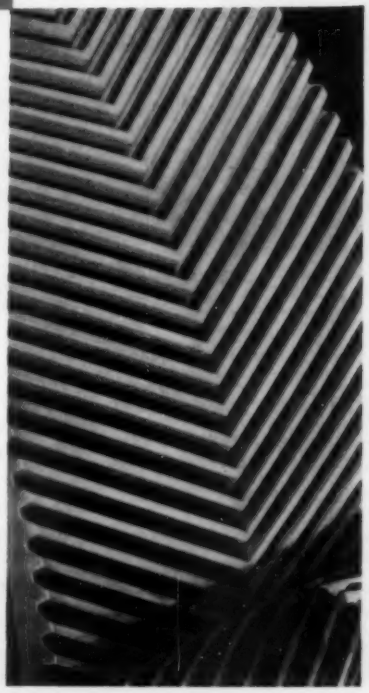
SINGLE STEP-UP UNITS—available with ratios ranging from 1.1 to 12:1.

DOUBLE STEP-UP UNITS—supplied with ratios ranging from 12:1 to 40:1.

TWO PINION UNITS—for transmitting power from a single engine to two pumps.

SEMI-HIGH SPEED UNITS—recommended when requirements fall between the range of type SI units and standard commercial speed reducers.

and backbone will keep it there



Besides matching a broad range of requirements for ratio, horsepower, loading conditions and similar factors, Farrel speed increasers offer the benefit of *backbone*. Formed where the teeth of the gears meet without a center groove, *backbone* puts the *full* face width of each gear to work. Benefit: Extra strength and staying power—important where service continuity is a must.

Proof of this dependability is on record. Since 1932, when Farrel SI units were first put into service, not one has ever had to be replaced.

Next time you're faced with a speed increasing problem, take it to Farrel. In the meantime, send for a copy of bulletin 451. No obligation.

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European Office: Piazza della Republica 32, Milano, Italy

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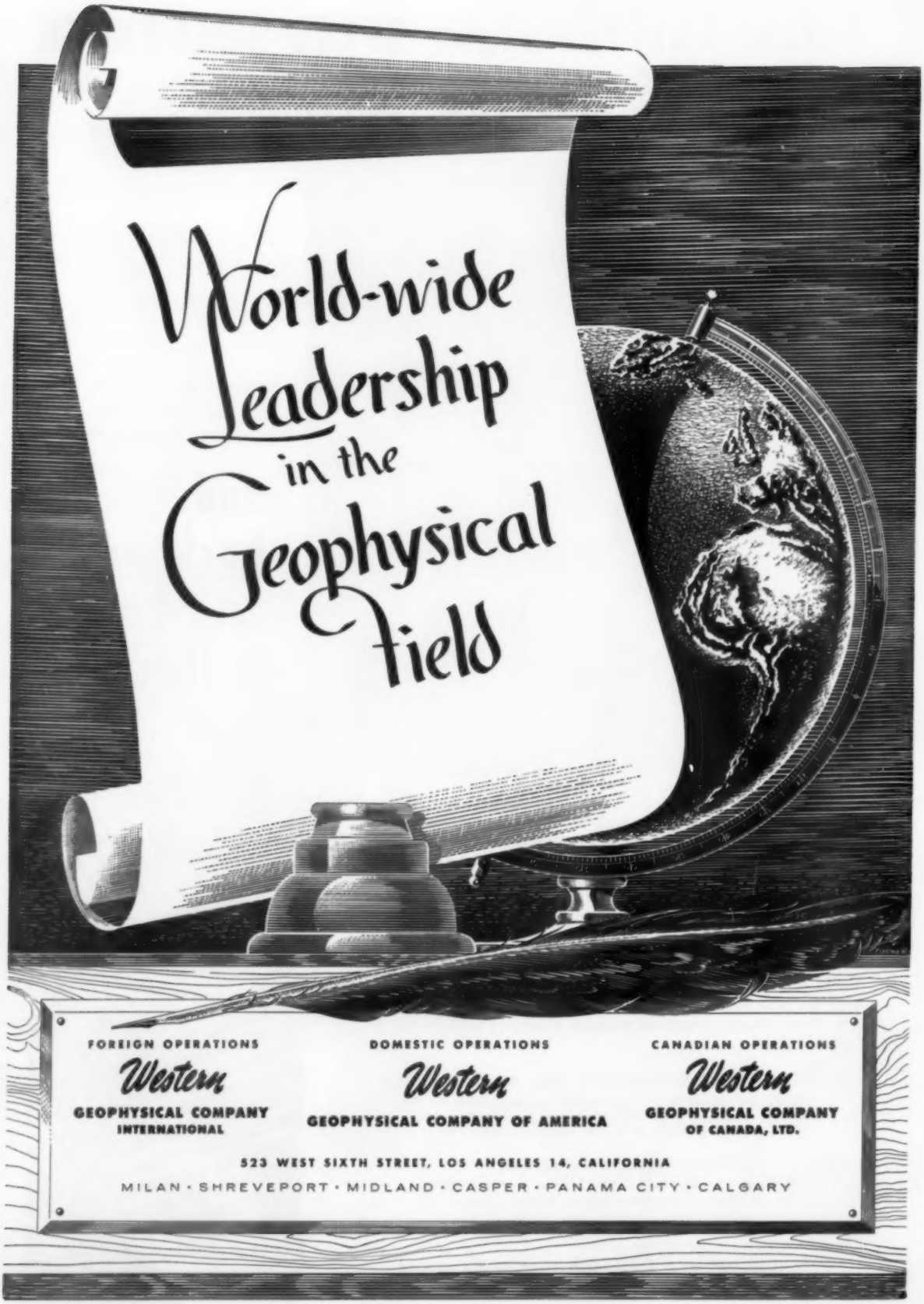
FB-1057A



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Yes! . . . it's ALL STEEL

HP RANGE:
½ to 50 hp

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OUTPUT SPEED RANGE:
420 to 5 rpm

TORQUE RATINGS:
up to 31,500 lb-in

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ALL STEEL
Shaft Mounted Drive

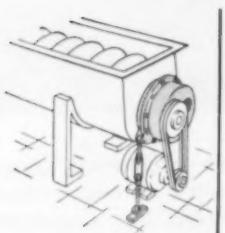
. . . Steel can "take it"!

STEEL frame . . . of fabricated plate supports all rotating elements—provides double the ability of iron to maintain vital alignment of revolving elements, even under shock load or external impact.

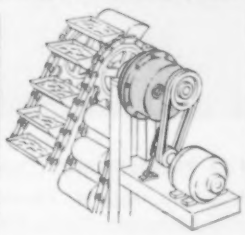
STEEL housing . . . will not fracture, serves only as protective cover and lubricant reservoir. Therefore, lubricant supply is safeguarded.

STEEL tie-rod and straddle-mounted tie rod brackets . . . are fastened to heavy steel frame by steel bolts in double shear.

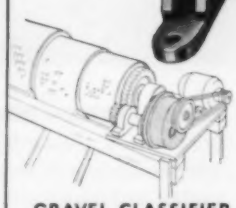
A FEW TYPICAL APPLICATIONS



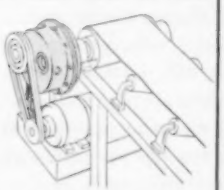
SCREW CONVEYOR



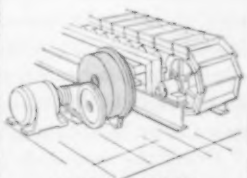
BUCKET ELEVATOR



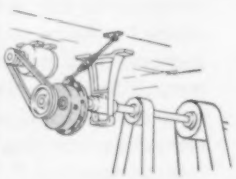
GRAVEL CLASSIFIER



BELT CONVEYOR



APRON FEEDER



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DELIVERIES TO MEET YOUR REQUIREMENTS

Off-the-shelf delivery **from your Authorized Falk Distributor.** ***Shipment from factory or warehouse stocks*** **within 72 hours after receipt of your order.**

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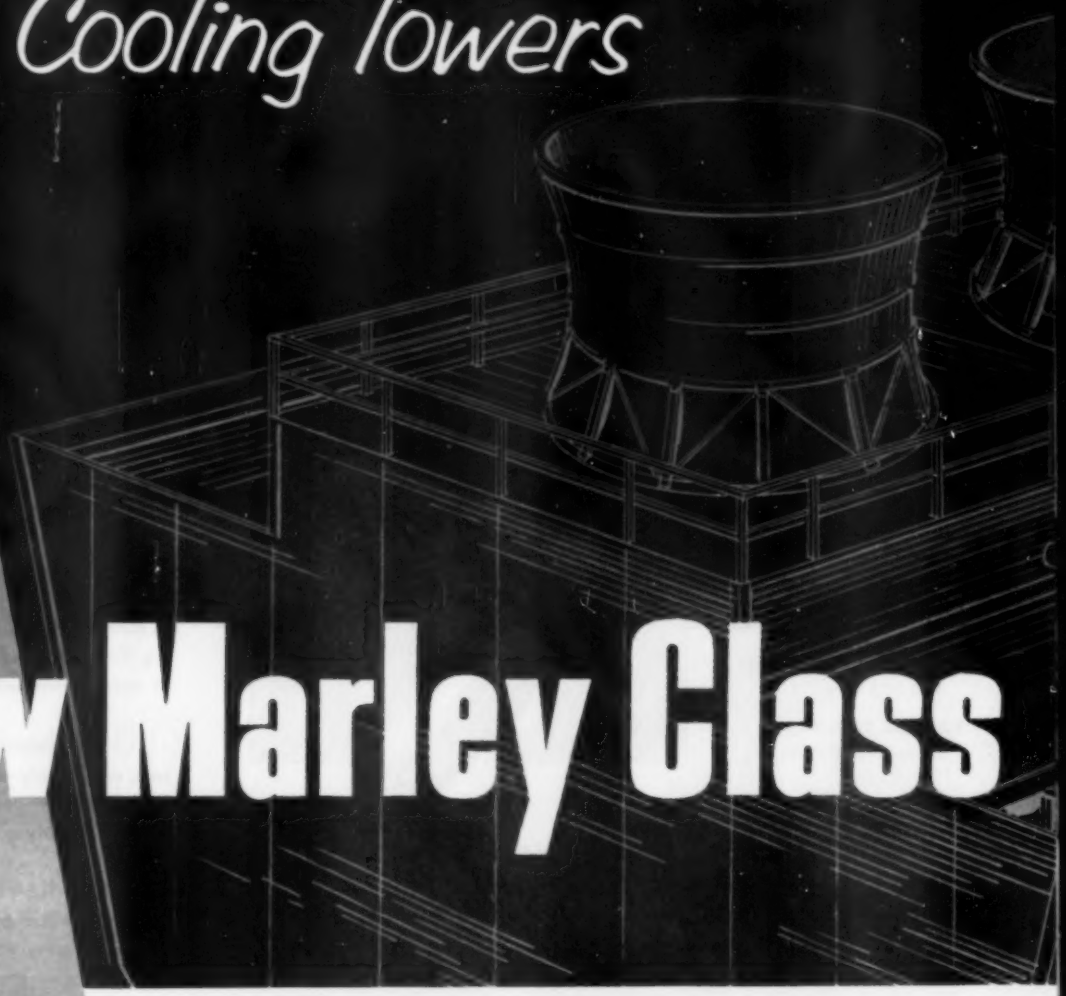
. . . a good name in industry

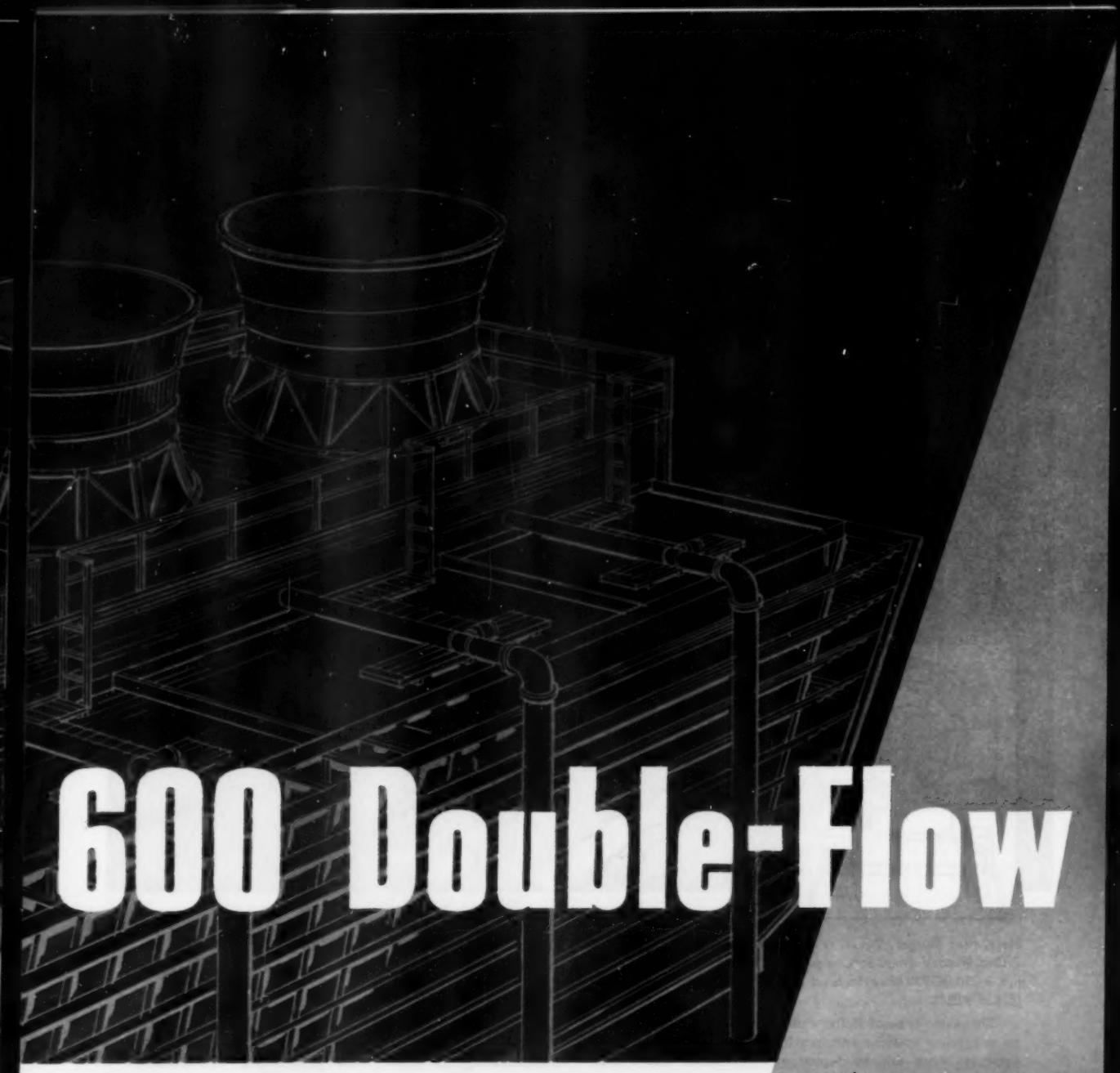
THE FALK CORPORATION, 3001 W. CANAL ST., MILWAUKEE 1, WIS.
Representatives and Distributors in Most Principal Cities
Manufacturers of Quality Gear Drives and Flexible Shaft Couplings

A new slant on industrial Cooling Towers



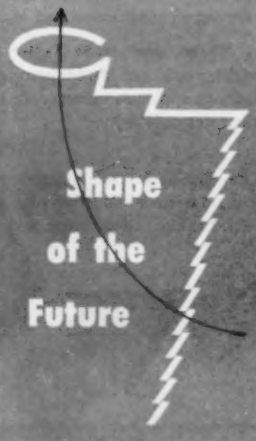
New Marley Class

NEW IN PROFILE — NEW IN PERFORMANCE. These characteristic advances announce a forward trend in cooling towers and introduce the new Marley Class 600 Double-Flow and Single-Flow models. They embody design improvements that are seven-league strides in water cooling practice and achievement. • • • The new profile is completely functional. It is the basis of many fundamental changes that mean increased cooling capacity in every frame size with greater power economy and no additional basin cost. Class 600 Cross-Flows have more filling and the ability to keep more water in the fill area; to reduce direct, unbroken water fall. The fill is of uniform width at all elevations, exposing the water to equalized air flow at all points of the cooling chamber. • • • From the new wide louvered walls to the fan, air flow is cleared of obstructing elements. Pressure control and air



600 Double-Flow

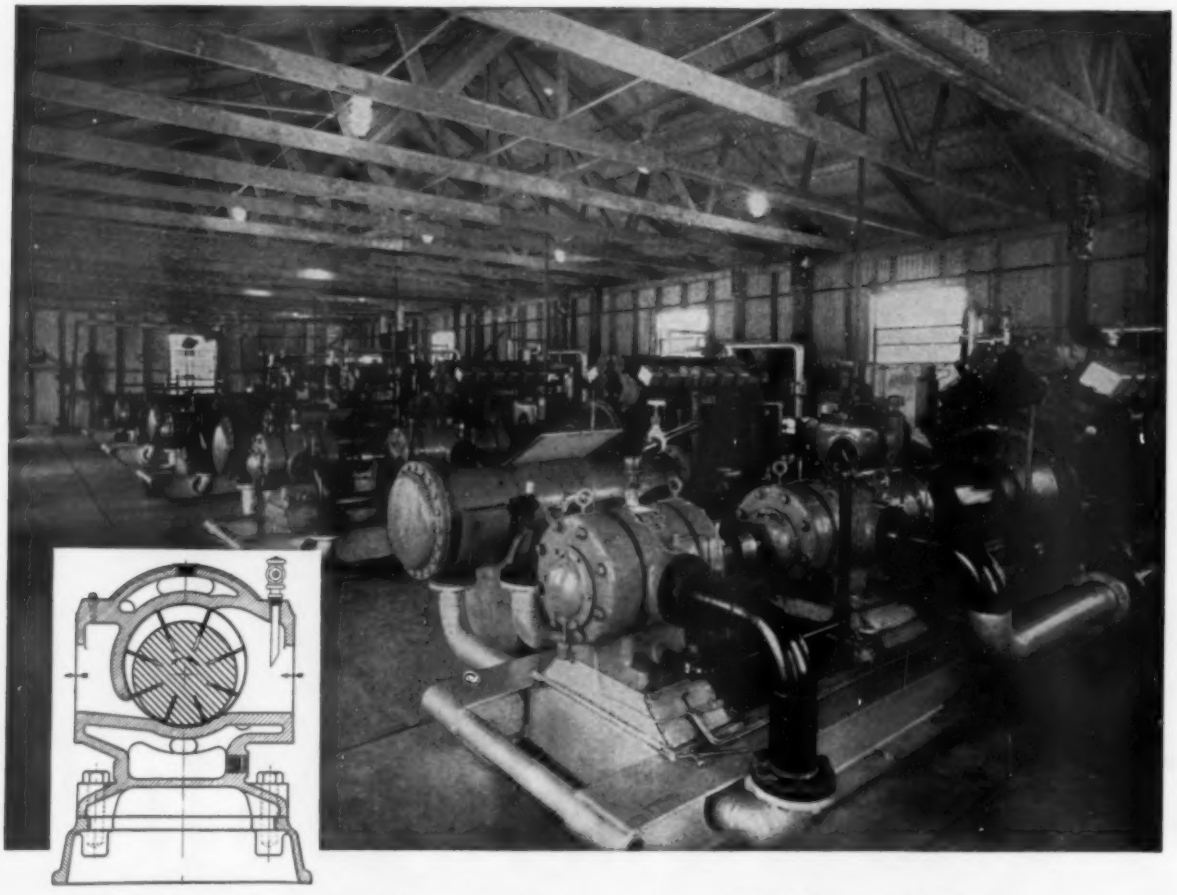
discharge are more proficient. This lowered draft loss efficiently balances increased water capacity in Class 600 Cross Flows. • • • The angled louver walls make possible simple controls that facilitate winter operation in areas where icing is a problem. • • • In Class 600 Cross-Flows extended durability—increased resistance to corrosion—keeps pace with stepped-up cooling ability. They are the first standard models completely asbestos cement board encased, and they introduce inert materials for use throughout the structure. • • • These towers establish a quality standard new to water cooling equipment and of importance to you as an investor. You can get all detailed information from the nearest Marley engineer in 56 major cities or by writing direct.



The Marley Company
Kansas City, Missouri

MARLEY

The "Inside" Story Of Fuller Rotary Compressors



Here, near Borger, Texas, is an installation of five two-stage Fuller Rotary Booster Compressors whose total capacity is 8,875,000 SCFD of casinghead gas compressing from 10 PSIG to 125 PSIG.

This same type of Fuller Rotary is used to boost gas into main booster stations and can be, and is, used where field pressures drop due to depletion. This latter use avoids expensive construction and increasing line sizes.

These, and other Fuller Rotary Compressors, now in widespread use throughout the petroleum industry, both indoors and out, incorporate trouble-free design that assures their dependability.

SIMPLICITY

The elimination of compressor valves, crankshafts, pistons and numerous other moving parts greatly reduces the need for attention, adjustment and replacement.

PULSATION—FREE FLOW

The smooth flow resulting from rotary compression eliminates pressure fluctuations and simplifies metering problems.

SUSTAINED PERFORMANCE

The blades are held out by centrifugal force, automatically compensating for wear, thus maintaining new-machine efficiency and/or capacity.

OPERATION WITHOUT VIBRATION

The rotary principle permits a compressor design completely free of reciprocating parts, thus avoiding the basic source of vibration.

The complete details, as well as sizes, of Fuller Rotary Compressors and Vacuum Pumps are available in Bulletin C-5A. We'd like you to have a copy. Send for it.

VISIT OUR BOOTH 1664
PLANT MAINTENANCE SHOW
CLEVELAND JAN. 28-31

FULLER COMPANY, 132 Bridge St., Catasauqua, Pa.

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C-289
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PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

The Number They Can't Forget

960

Chapman List 960
Forged Steel Gate Valves

They can't forget it. They can't *afford* to forget it . . . 960 . . . Chapman List 960. You'll find more of these valves at work on more jobs than any other small forged steel gate valve. And it all boils down to two important points . . . performance and working costs.

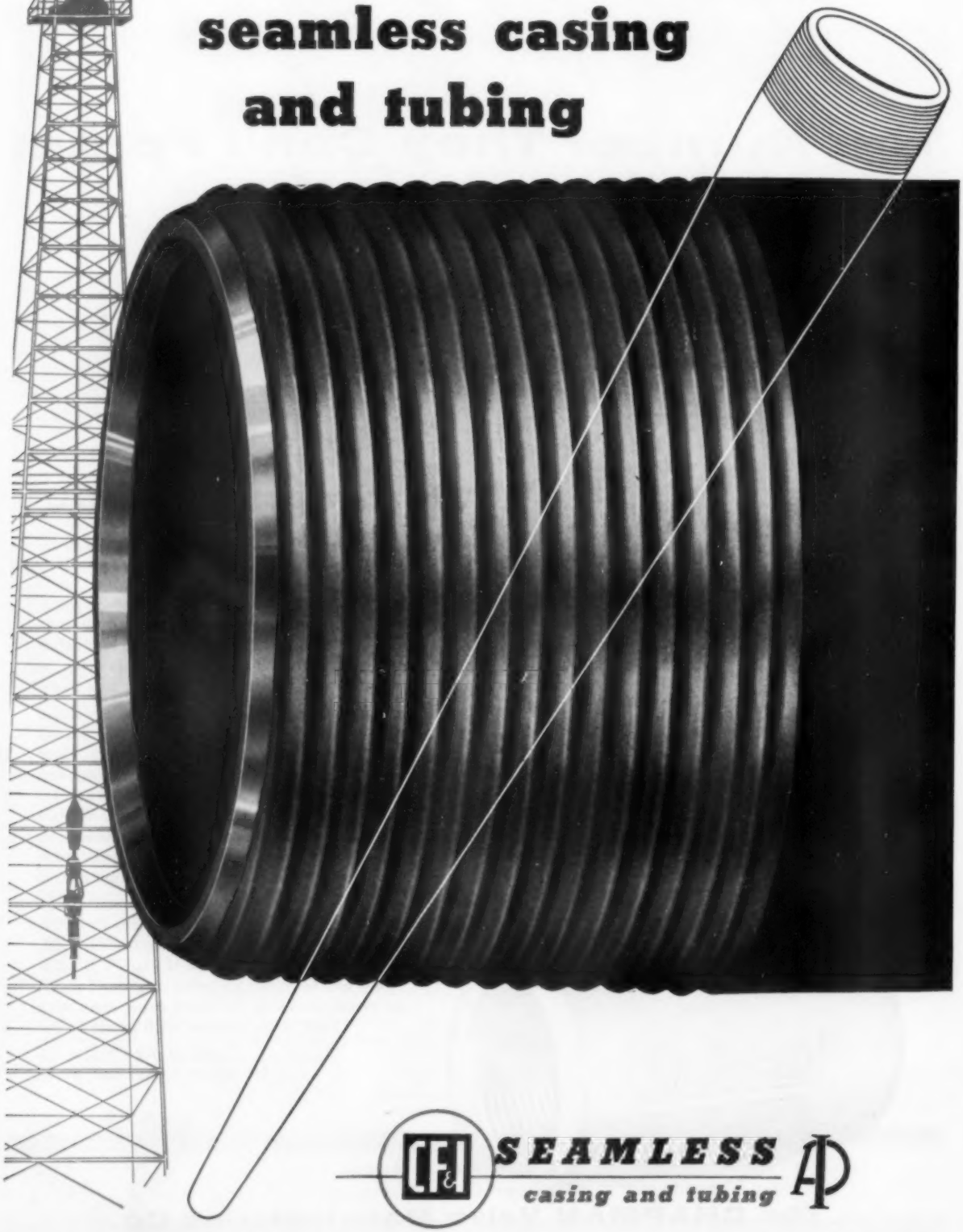
With Chapman List 960 Forged Steel Gate Valves, wedge faces are super hard . . . *hardened to 800 Brinell by Chapman's exclusive Malcomizing process.* They can't gall. They can't seize. And the seat rings are hardened stainless steel . . . built for rugged service and very easy to replace when necessary. What's more, you have no full-pressure replacing difficulties. You get top performance with the barest minimum of troubles and costs for maintenance.

You can handle, perfectly, anything from 380 psi at 1000°F. to 2000 psi at 100°F. with Chapman List 960. For higher pressures, you use Chapman List 990. Sizes for List 960 run from ¼″ to 2″. Bonnet joint can be either gasketed or ground metal to metal. And you can order rising stem with yoke or rising stem with inside screw.

Look at our Catalog 10.
If you don't have one, write.

The CHAPMAN Valve Manufacturing Co.
INDIAN ORCHARD, MASSACHUSETTS

CF&I...for top quality seamless casing and tubing



CF&I SEAMLESS casing and tubing API

THE COLORADO FUEL AND IRON CORPORATION • DENVER, COLORADO

Small but significant. The minute atom abruptly revolutionized scientific theories with its significance. General's automatic plotter and computer—the *Geopac*—has also revised modern thinking. This *compact unit* presents an entirely *new concept* in seismic interpretation. Offering speed and accuracy, the *Geopac* frees the seismologist from numerous routine details. *Geopac*—the efficient, economical method of processing and presenting seismic data.

Plotter Console

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General GEOPHYSICAL COMPANY

In Canada: 10509 81st Avenue, Edmonton, Alberta, Canada

General Geophysical Company de France (Sarl), 4 Square Rapp • Paris 7, France
General Geophysical Company de Venezuela, C. A., Sociedad A. Comeje No. 16 • Caracas, Venezuela

WHEN YOUR CONTRACT IS WITH GENERAL, THE PERCENTAGE FOR SUCCESSFUL EXPLORATION IS IN YOUR FAVOR

This is Why the Nash is the Most Simple Compressor

It's the Nash!

There are no mechanical complications in a Nash Compressor. A single moving element, a round rotor, with shrouded blades, forming a series of buckets, revolves freely in an elliptical casing containing any low viscosity liquid. This liquid, carried with the rotor, follows the elliptical contour of the casing.

The moving liquid therefore recedes from the rotor buckets at the wide part of the ellipse, permitting the buckets to fill with gas from the stationary Inlet Ports. As the casing narrows, the liquid is forced back into the rotor buckets, compressing the gas, and delivering it through the fixed Outlet Ports.

Nash Compressors produce 75 lbs pressure in a single stage, with capacities to 6 million cu. ft. per day in a single structure. Since compression is secured by an entirely different principle, gas pumping problems difficult with ordinary pumps are often handled easily in a Nash.

Nash simplicity means low maintenance cost, with original pump performance constant over long periods Data on these pumps sent immediately on request

No internal wearing parts.

No valves, pistons, or vanes.

No internal lubrication.

Low maintenance cost.

Saves floor space.

Desired delivery temperature automatically maintained.

Slugs of liquid entering pump will do no harm.

75 pounds in a single stage.

NASH ENGINEERING COMPANY
313 WILSON, SO. NORWALK, CONN.

SAVE 2 WAYS WITH

MARTIN RUBBER GUIDE CAGES

1. GREATER PRODUCING PROFITS *because:*

Martin Cages last much longer. The oil-proof rubber guides do the trick, by absorbing the ball peen hammer action of the hard balls. They also have superior resistance to sand abrasion. And they can be replaced.

2. GREATER PRODUCING PROFITS *because:*

Ball & Seat life is usually doubled, on the average. With the rubber guides, there is much less chattering, chipping and pitting. Ball falls true on seat. Such improvement in Ball & Seat life eliminates a lot of pulling expense.

In the last year alone, new users of Martin Cages have increased by 85%. The word is getting around. More and more economy-minded producers are learning about the advantages of the Martin Cages! . . . Manufactured in open and closed types . . . all diameters and styles. Write for John Martin Catalog No. 4 today. *Martin Cages are available through all supply stores.*

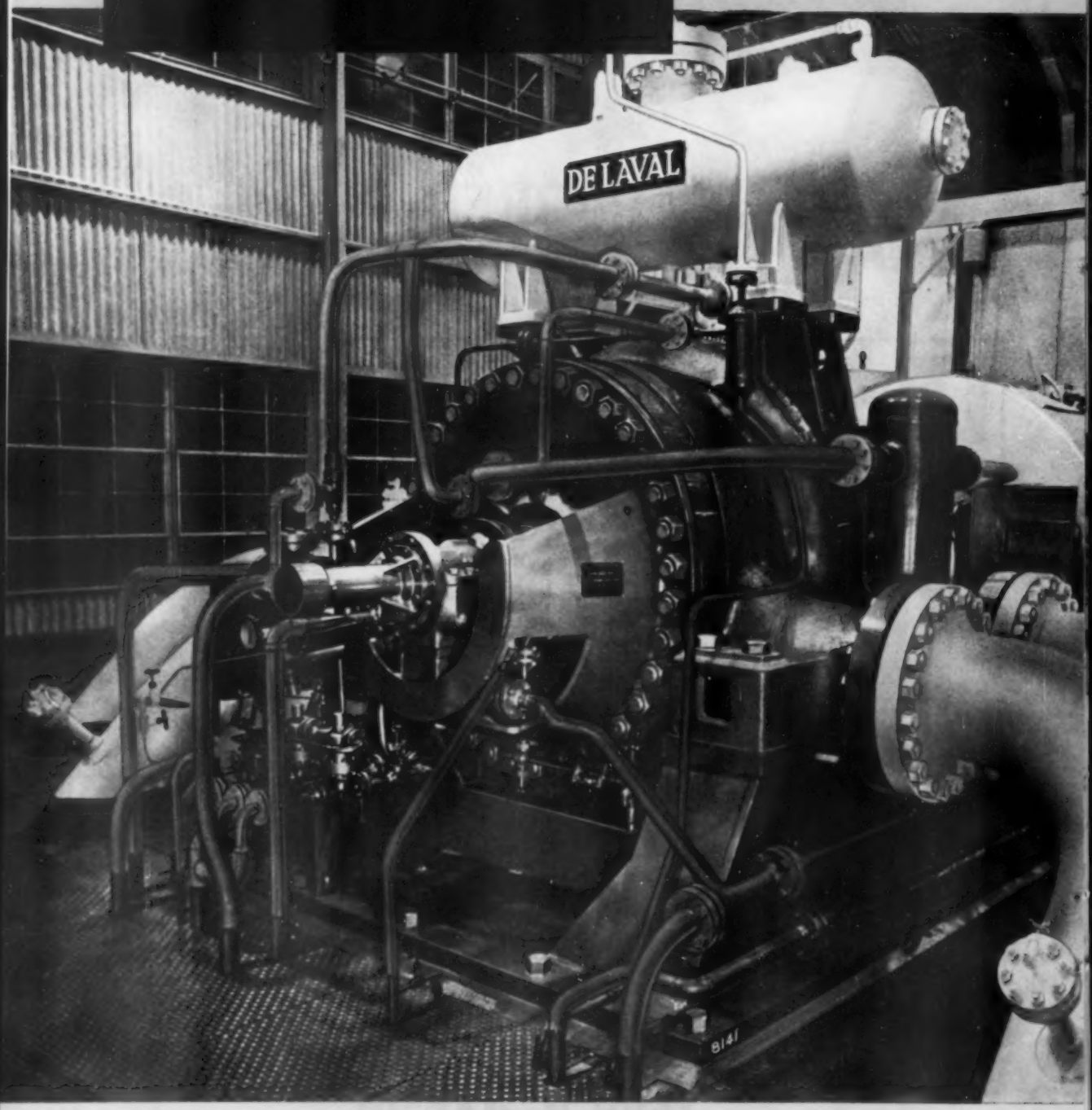
JOHN N. MARTIN

Manufacturer

9 W. BRADY • TULSA, OKLA.

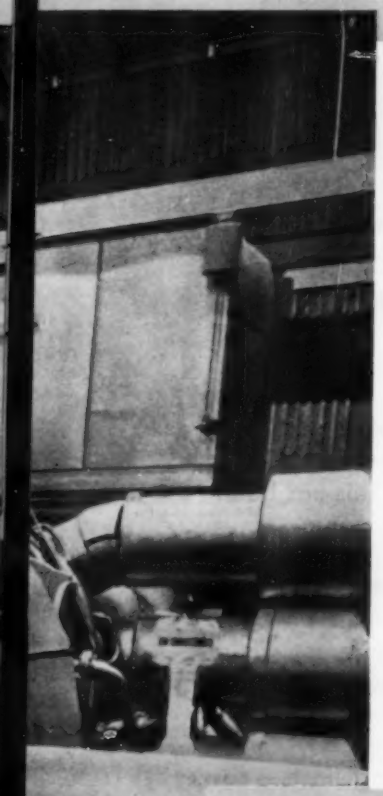
DE LAVAL
Series-Parallel
CENTRIFUGAL COMPRESSORS

provide extra



This De Laval Series-Parallel 6,350 hp centrifugal compressor is giving round-the-clock service in the Edna Station of the Trunkline Gas Company. Two other identical De Laval S-P units are doing a dependable job in the Kountze and Premont, Texas stations of this natural gas transmission system.

flexibility for Trunkline Gas Company

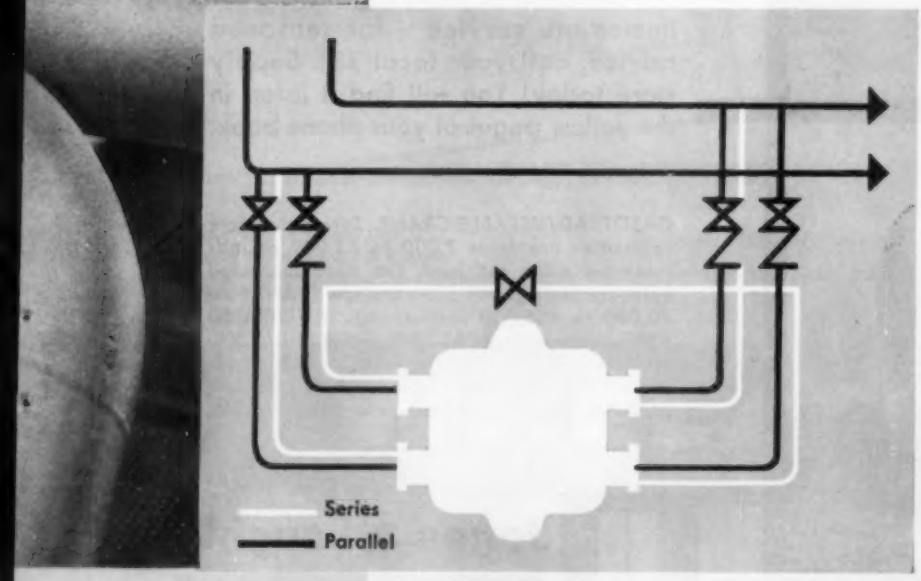


Booster station service demands flexibility in pipeline compressor design, which is available to a considerable degree in the standard De Laval single stage pipeline compressor. Some applications, however, require an exceptionally wide range, and the De Laval Series-Parallel centrifugal compressor has been designed to meet that need.

A good example is the De Laval Series-Parallel 6,350 hp compressor, shown in the photograph at left. It is one of three identical units serving booster stations of the Trunkline Gas Company.

S-P compressors are multi-stage units with the impellers arranged in two groups. Two inlet nozzles permit operating the impeller groups in series or in parallel as shown in the flow diagram. Within the horsepower limits of the driver, the compressor can be transformed from a high-flow, low-head machine to a low-flow, high-head unit *simply by operation of the external valving*. No changing of parts, not even a shutdown is necessary.

The reliability and economy of De Laval centrifugal compressors have been proved in natural gas transmission service throughout the country. You will find it pays to look to De Laval . . . the company that has specialized in the development of these units. De Laval pipeline compressors are operating in sizes from 2500–15,000 hp and with all types of drivers—gas turbines, gas engines, steam turbines and electric motors.



For additional information, write for the article "Tailoring Centrifugal Compressors for Pipe Lines" as well as De Laval Bulletin 503.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL393

J&L can give your oil a real LIFT!

J&L Supply men from the Gulf of Mexico into Canada and from the Rocky Mountains east keep a vigilant eye on producing wells. This has been going on for over fifty years.

Cabot units expertly engineered to fit your wells put J&L men on your team. They never lose interest. Field service shops in the United States and Canada never close.

For the best in pumping units—for immediate service — for seasoned advice, call your local J&L Supply store today! You will find it listed in the yellow pages of your phone book.

CABOT ADJUSTABLE-CRANK Series structure capacities are from 7,000 to 32,000 pounds maximum polish rod load. The flood lubricated Sykes-cut herringbone gears are rated (API) from 40,000 to 456,000 inch-pounds. ILLUSTRATED HERE: Upper right, AC15-114D, polish rod 15,000; peak torque 114,000. Upper left, AC13-114D, polish rod 13,000; peak torque 114,000. Lower left, AC9-40D, polish rod 9,000; peak torque 40,000.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

J&L – A GREAT NAME IN SUPPLIES

12M

Field Proven in a 4 YEAR TEST!

TURNER & WEST
BOX 1168
GRAHAM, TEXAS

April 24, 1957

Mr. Gordon P. Street, President
The Wheland Company
Chattanooga, Tennessee

Dear Mr. Street:

We purchased one of your HP-14000 pumps about four years ago. This pump has done a tremendous amount of work during this time, with a minimum of expense. We believe your pump is thoroughly field proven.

We operate this rig in North Texas area, drilling interest deals and for our own accounts, from 3000 to 5000 feet.

Yours very truly,

TURNER & WEST

R. C. Turner

Four years of dependable, low-cost operation from this efficient Wheland HP-14000 Pump shown on location in North Texas. Owner, Mr. R. C. Turner of Turner & West, is shown at left, standing beside Wheland representative, Mr. A. B. Drake.

WHELAND HP-14000 DUPLEX SLUSH PUMP

"...has done a tremendous amount of work...with a minimum of expense...thoroughly field proven."
—Mr. R. C. Turner

HP-14000 — 7½" x 14", 350 HP Nominal Input at 60 RPM. Discharge Pressure with 7½" liner 838 PSI, with 5½" liner 1627 PSI.

From the Complete Line of Efficient Wheland Slush Pumps.
WRITE FOR DESCRIPTIVE BULLETINS.

TROUBLE-FREE OPERATION • LOWER MAINTENANCE
DELIVERS MORE PRESSURE PER POUND OF PUMP!

WHELAND
ROTARY DRILLING MACHINERY

THE WHELAND COMPANY
CHATTANOOGA, TENNESSEE, U.S.A.
DRAW WORKS • SLUSH PUMPS • ROTARIES
CROWN BLOCKS • TRAVELING BLOCKS • SWIVELS

DOMESTIC DISTRIBUTORS: INDUSTRIAL SUPPLY COMPANY, INC.—Main Office: Wichita Falls, Texas • HOUSTON OIL FIELD MATERIAL COMPANY, INC.—Main Office: Houston, Texas • JONES AND LAUGHLIN STEEL CORPORATION, SUPPLY DIVISION—Main Office: Drawer 2481, Tulsa 2, Oklahoma.

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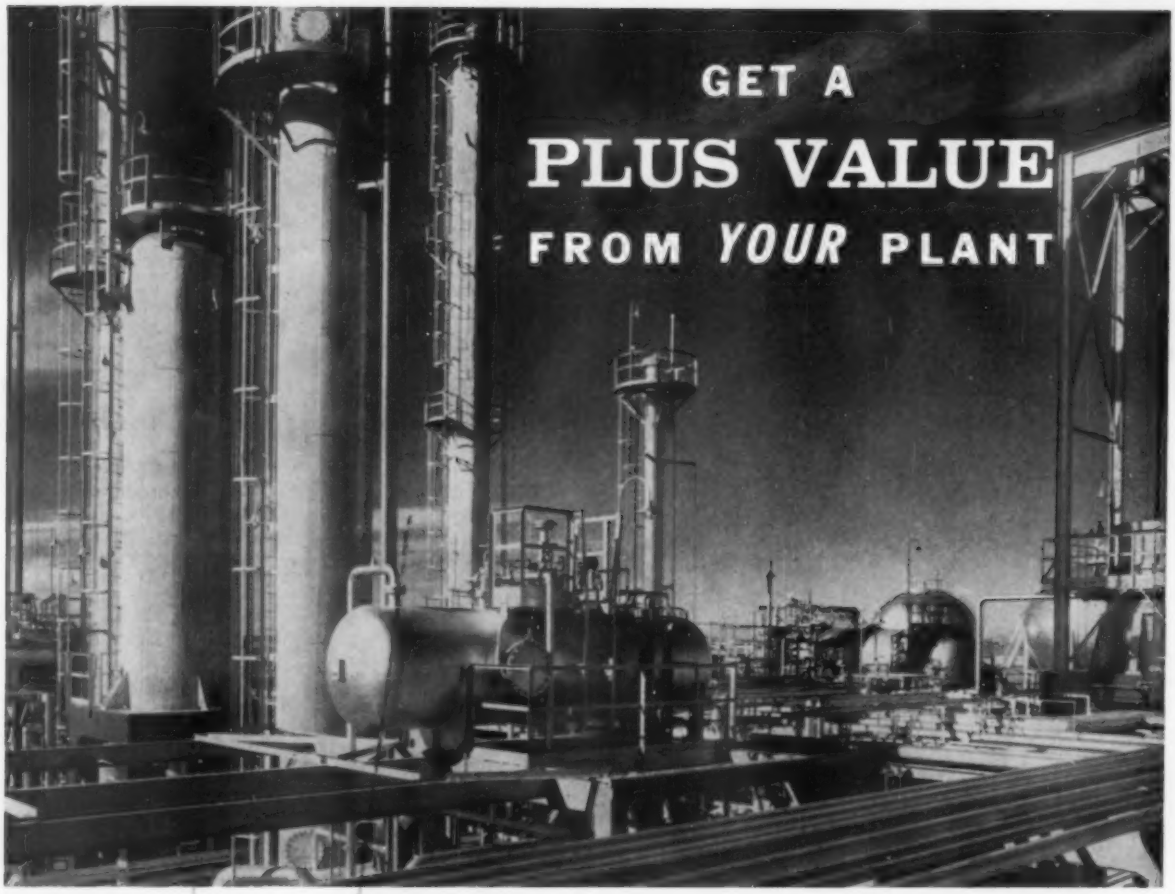

You always get a *plus value* in engineering ability and construction skill when your plant is planned and built by The REFINERY ENGINEERING Company. TRECO has never been guided by *minimum* requirements on any job, large or small.

Remember the *plus value* TRECO offers when you plan your next plant.

A brochure showing work done by TRECO is available. A copy will be mailed you promptly upon request on your company's letterhead.

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A DIVISION of VITRO CORPORATION of AMERICA

The REFINERY ENGINEERING Company

NEW YORK TULSA TORONTO

NOW... THE LEADER IN PROTECTIVE PIPE COATINGS AND WRAPPER COMBINATIONS BRINGS YOU...

Dearborn® F.O.S. Safe-T-Clad®

THE SUPERIOR POLYETHYLENE PRESSURE-SENSITIVE TAPE

Actual sample of Dearborn No. 655 F.O.S. Safe-T-Clad Tape

- *GREATER ADHESIVE PROPERTIES*
- *GREATER TENSILE STRENGTH*
- *THICKER, MORE UNIFORM*

YET COSTS NO MORE!

Dearborn F.O.S. Safe-T-Clad gives you all these advantages: reduced labor costs . . . the elimination of equipment and dope kettles . . . lower shipping, handling and warehousing costs.

The big reason why you'll like this new Dearborn tape better is because of its proven superiority. For example: its greater thickness means more lasting protection; its greater elongation and adhesive properties mean surer protection. *For other points of superiority, check the performance properties table on the next page.*

Dearborn F.O.S. Safe-T-Clad may be applied by hand or Traveliner, comes in widths from 1" to 15", in lengths to suit your needs.

Write for informative booklet—

meanwhile...

check the performance properties table on the next page

Dearborn® CHEMICAL COMPANY
MERCHANDISE MART PLAZA • CHICAGO 54, ILLINOIS

WORLD'S MOST COMPLETE LINE OF PROTECTIVE MATERIALS FOR THE CONTROL OF CORROSION

PERFORMANCE PROPERTIES

OF DEARBORN NO. 655 F.O.S. SAFE-T-CLAD TAPE

PHYSICAL	TEST METHOD	DATA
Color		Black
Backing Material		Polyethylene
Adhesive		Synthetic
Thickness:		
Backing	ASTM D-1000-48T	10 mils
Adhesive	ASTM D-1000-48T	3 mils
Total Thickness	ASTM D-1000-48T	13 mils
Moisture Vapor Transmission Rate	JAN-P-127	0.2 gm./100 sq. in./24 hr.
Moisture Absorption	ASTM D-570-42	0.02%
Tensile Strength (2" width) (Machine direction)	ASTM D-1000-48T Mod.	30 lbs./1" grab
Tensile Strength (2" width) (Cross direction)	ASTM D-1000-48T Mod.	30 lbs./1" grab
Elongation (Machine direction)	ASTM D-1000-48T Mod.	500% plus
Elongation (Cross direction)	ASTM D-1000-48T Mod.	500% plus
Tear Resistance (Machine direction)	ASTM D-689	Not less than 950 gm.
Tear Resistance (Cross direction)	ASTM D-689	Not less than 950 gm.
Adhesion to steel	ASTM D-1000-48T Mod.	Min. 43 oz./1" width
Adhesion to backing (180° pull)	ASTM D-1000-48T Mod.	Min. 32 oz./1" width
*Temperature performance range	Dearborn	−30° F. to 200° F.
Weatherometer	Dearborn	No effect/70 hrs.

ELECTRICAL	TEST METHOD	DATA
Dielectric Strength	ASTM D-1000-48T Mod.	Min. 15,000 volts
Insulation Resistance	ASTM D-257	One million megohms

RESISTANCE TO:	TEST METHOD	DATA
Acids, Inorganic and Organic (Aqueous solutions)	Dearborn	Excellent
Alcohols (Water soluble)	Dearborn	Excellent
Alkalies	Dearborn	Excellent
Amines (Aqueous solutions)	Dearborn	Excellent
Animal Acids	Dearborn	Excellent
Bacteria	Dearborn	Excellent
Fungi	Dearborn	Excellent
Hydrocarbons, Aliphatic	Dearborn	Fair
Hydrocarbons, Aromatic	Dearborn	Fair
Ketones, Esters (Aqueous solutions)	Dearborn	Good
Oils	Dearborn	Fair
Salt Water	Dearborn	Excellent
Vegetable Acids	Dearborn	Excellent
Water	Dearborn	Excellent
Weathering	Dearborn	Excellent

*Dearborn #655 F.O.S. Safe-T-Clad Tape will retain its physical quality within this range of temperatures, but application should only be undertaken at temperatures above 32°F.

STANDARD ROLL

13 Mils Thick—On 1½-in. ID Cores

STANDARD PACKING

Roll Size	Rolls Per Case	Rolls Per Square	Squares Per Case
1" x 100 Ft.	48	12	4
2" x 100 Ft.	24	6	4
4" x 100 Ft.	12	4	4
6" x 100 Ft.	8	2	4
9" x 100 Ft.	4	1⅓	3

We can furnish rolls in 200 and 300 foot lengths, and widths not shown at left, upon request, and subject to manufacturing availability. *Dearborn #655 F.O.S. Safe-T-Clad Tape is sold in case lots only.*

TRAVELINER ROLL

Traveliner Rolls can be manufactured to order in 400, 600 and 800 foot roll lengths on 3 inch I.D. cores in 10 inch and 15 inch widths only.

Price information, samples and name of nearest Distributor will be supplied upon request.

KEEP THIS DATA IN YOUR FILE UNTIL YOU RECEIVE THE INFORMATIVE BOOKLET OFFERED ON PREVIOUS PAGE

Dearborn® CHEMICAL COMPANY
MERCHANDISE MART PLAZA • CHICAGO 54, ILL.

we can show you the forest

<u>because</u> of the trees

Many times oil men feel they are in a poor position financially simply because they can't see the entire picture of their operations. Caught in the complexities of their day-to-day activities, they are unable to survey their properties in a realistic, objective manner. And as a result, many times they end up working for their creditors.

Increased operating costs spell falling profits. And that means trouble. While there is no short cut way out of this problem, The Commerce working with your legal and tax counsel can many times show you how to increase profit by reducing costs. Tighter managerial control, an analysis of costs, and recommendations for changes have increased the profit of other oil men. If your problems are similar, come to the bank that actually does know the oil business and that can help you.

E. O. Buck, vice president, Oil Loan Department

Member Federal Deposit Insurance Corporation

THE NATIONAL BANK OF

COMMERCE

Gulf Building, Houston, Texas **OF HOUSTON**

Facilities of The National Bank of Commerce Oil Loan Department are available in Wyoming, Nebraska, Colorado, New Mexico, Texas, Louisiana, and Mississippi.

How 4 big companies cut evaporation loss with "Microballoon"* spheres...

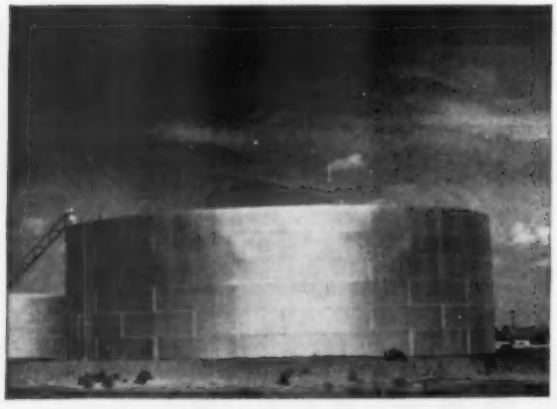
Savings up to

SOHIO—THREE YEARS

of savings have shown the effectiveness of this evaporation control method. The layer of "Microballoon" spheres in each tank on this five-tank farm is still intact. Four tanks have a 7-day cycle with 7 RVP oil. Fifth handles 4 to 5 RVP oil on 23-25-day cycle.

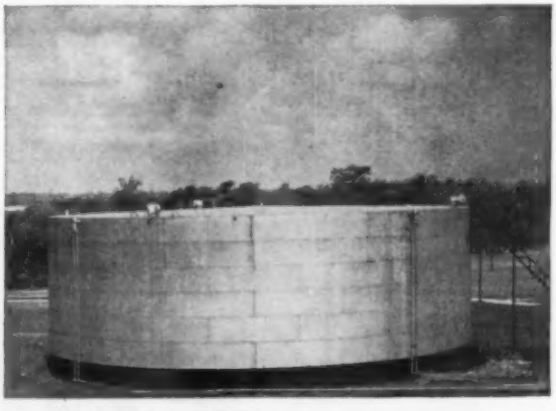
D-X SUNRAY—THREE YEARS

ago a layer of "Microballoon" spheres was installed in this 350,000 bbl. working storage tank. About 6,700,000 bbl. of select crude and mixed crude-casinghead gasoline have been pumped through, with vapor loss cut an estimated 70-80%. Tank is pumping or receiving 80% of the time.



COSDEN—THREE YEARS

after installing 4500 lbs. of "Microballoon" spheres in each of these tanks, an average of 1,500,000 bbl. have been pumped through per year. The foam seal is still at work, stopping evaporation an estimated 75%. Tanks handle sweet crude with high gravity—about 37° to 45° API. Gas content—40 to 50%.



SINCLAIR—THREE YEARS

of service in this cone-roofed tank have shown how much the layer of "Microballoon" spheres can save. A 50 per cent cut in evaporation loss is estimated, and other tanks at the site are due for the same treatment. Tank's average temperature is 75 deg. F., RVP is 5.6 psi.

*Registered trade-mark of The Standard Oil Co. (Ohio)

80%...year after year!

Evaporation loss was cut as much as an estimated 80 per cent for the cone-roofed tanks shown at left. For several years, these tanks have been equipped with a layer of "Microballoon" spheres. These microscopic hollow spheres of BAKELITE Brand Phenolic Resins form a blanket that floats on the surface of crude oil, preventing escape of costly volatiles.

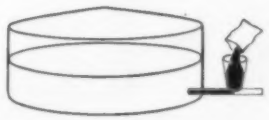
If you are seeking an inexpensive, convenient, quickly-installed method of controlling evaporation loss, these case histories prove that this is a good place to begin. Learn how "Microballoon" spheres made from BAKELITE Phenolic Resins can work for you. Write Dept. BB-128.

FOR EVAPORATION CONTROL

BAKELITE
BRAND
RESINS

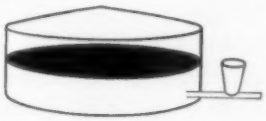
UNION CARBIDE

HOW "MICROBALLOON" SPHERES WORK TO CUT EVAPORATION LOSS



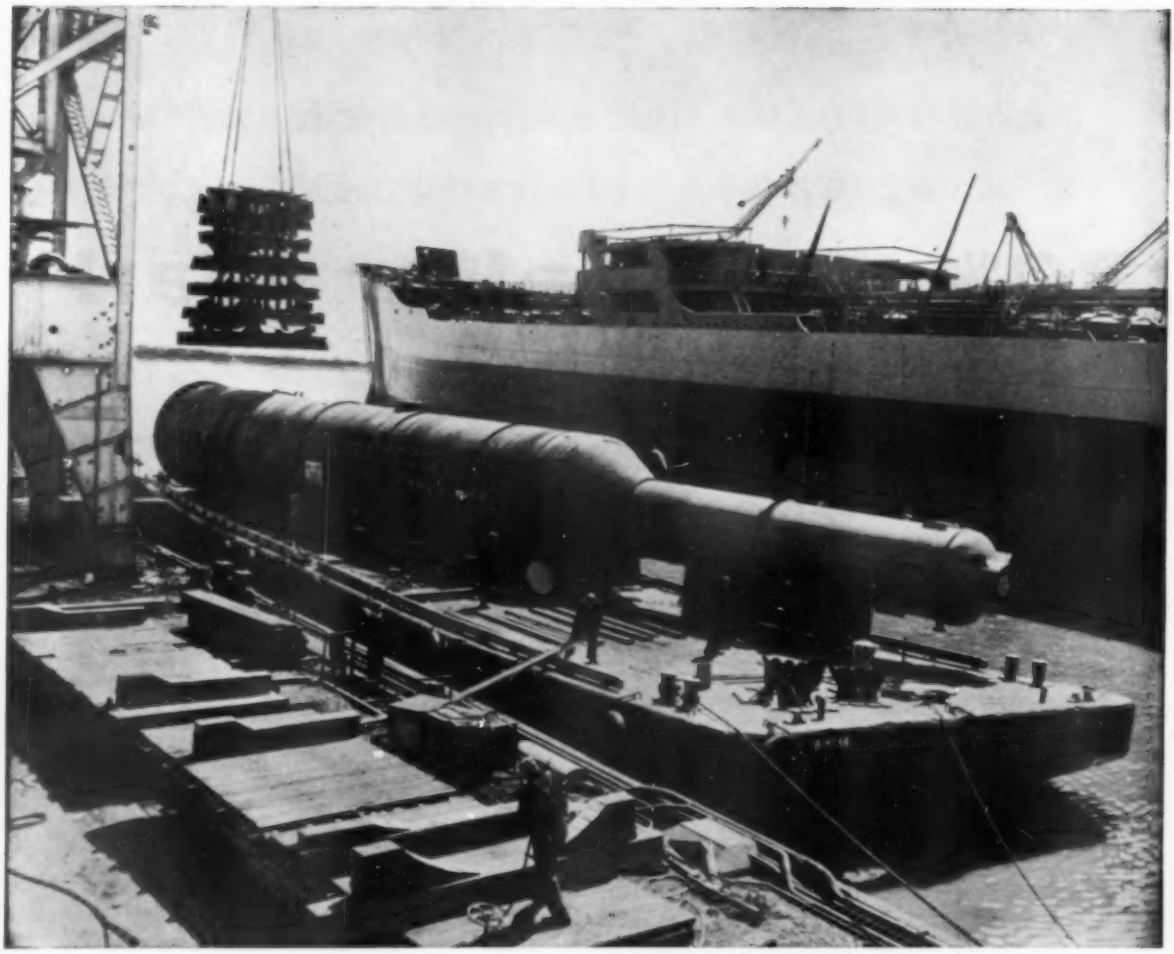
1 **"Microballoon" Spheres are mixed with oil being pumped into the tank.**

2 **They immediately start floating to the oil surface, form a blanket in a few hours.**



3 **The blanket seals the entire surface within the tank. This surface seal cuts evaporation loss.**

BAKELITE COMPANY, *Division of Union Carbide Corporation,* 30 East 42nd Street, New York 17, N. Y.
In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Belleville, Ontario
The terms BAKELITE and UNION CARBIDE are registered trade-marks of UCC.



standard procedure: VERSATILITY...

The variety of work which Sun Ship's integrated shops produce for use by industries on land and sea brings a matching variety of shipping problems.

Our facilities for tidewater shipment are used to economical advantage on many of the massive structures that go into the making of the nation's petroleum and chemical industries. The barge shipment of tower and shed row baffles, shown above, is a good example.

And of course—when shipment by land is necessary—Sun Ship rigging and routing find the ways and means to handle such items as large-diameter columns by rail and truck.

It's all a part of the versatility which forty years' experience has made part of "standard procedure" in service of its customers.

Our Sales Engineering Department would be glad to use its experience in helping you overcome any problem of construction or shipment that faces you. Write

Sun

SHIPBUILDING & DRY DOCK COMPANY

ON THE DELAWARE (SINCE 1916) CHESTER, PA.

CP GAS ENGINES SET PERFORMANCE RECORDS

at The Peoples Natural Gas Company

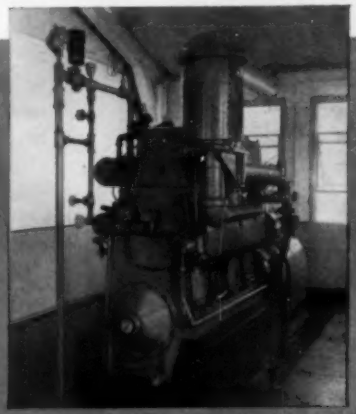
...NO REPLACEMENT PARTS IN OVER 20,000 HOURS!...

...NO PLUGS OR MAGNETO POINTS REPLACED IN OVER A YEAR!

...LUBE OIL CONSUMPTION 18,000 HP/hrs. PER GALLON!...

FUEL CONSUMPTION – LOW AS 7.2 cu. ft. per HP/hr. @ FULL LOAD

Entire plant operation depends on the CP-39, left, and the CP-49 Gas Engine in right background.



Front view of the CP-49 in operation at Peoples Natural Gas Company.

A pair of CP naturally aspirated, spark ignited natural gas engines, developing a total of 260 h.p., are installed at The Peoples Natural Gas Company, McKeesport, Pa. These units generate electricity to run water pumps cooling a bank of compressors, electricity for fan chilling the cooling water, and electricity for plant lighting and instrumentation. Operators report that these engines are easy to start, simple to maintain and respond promptly to load changes. Since their installation in September 1952, these CP Gas Engines have been rated as among the best engines of their type in the gas transmission system of this company.

CP Spark Ignited Gas Engines are available from 100 h.p. to 2000 h.p.

Chicago Pneumatic 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

How TORQUE CONVERTERS help make hole *FASTER, CHEAPER!*

The only successful way of getting oil out of the earth is to go down after it—with horsepower.

The trick is: how to transmit horsepower efficiently and profitably. And that's where Twin Disc Torque Converters come into the picture.

Twin Disc Torque Converters have been used in almost every type of oilfield equipment application . . . used for increased production . . . used for reduced machinery maintenance . . . used for greater over-all profits. And here are seven good reasons why:

1. Twin Disc Torque Converters (three-stage) offer the highest engine output torque multiplication—up to 6:1 if the load requires it.

2. They eliminate engine lugging and stalling . . . permit engines to work in their most efficient speed range, producing maximum horsepower output whenever required.

3. They match drilling speed to compensate for varying degrees of earth formation hardness . . . for highest drilling efficiency.

4. They permit holding and controlling loads such as drill pipe simply through throttle manipulation . . . for greater accuracy in delicate operations and greater all-round safety.

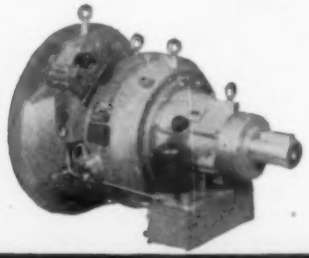
5. They give mud pumps a new degree of flexibility. While engines operate at constant speed, torque converters permit pumps to operate at varying speeds according to load demands . . . to maintain steadier, higher pressures with a minimum of liner changes.

6. They permit more efficient engine operation by improving load balance in applications where engines are compounded.

7. Because of their fluid connection, they dampen out destructive shocks and vibrations between engines and driven equipment . . . for longer lasting machinery life . . . and less downtime for maintenance and parts replacement.

Leading oilfield equipment manufacturers everywhere offer Twin Disc Torque Converters either as standard or optional equipment . . . to provide their customers with these seven profit-making advantages.

Twin Disc Torque Converters are available in both three-stage and single-stage designs . . . to 1000 hp in capacity . . . and therefore Twin Disc engineers can offer completely unbiased recommendations for torque converter applications.



TWIN DISC

TWIN DISC

Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES OR SALES ENGINEERING OFFICES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • TULSA

Here J. R. Phillips' HD-11 digs a slush pit. Tractor develops 94 belt hp, weighs 24,800 lb (as illustrated).

"My Allis-Chalmers Crawlers move dirt big, move it quick"

Says J. R. Phillips, Oil Field Contractor

"When I put a tractor to moving dirt, I want it to do two things—move it big and move it quick," says J. R. Phillips of Farmington, New Mexico. "I've got two Allis-Chalmers HD-16's and an HD-11—they're dirt-moving sons-of-guns."

Leveling this well site is a quick, easy job with the 141-belt-hp, 38,650-lb (as illustrated) HD-16. Allis-Chalmers HD-16 is available with either standard (as illustrated) or torque converter drive.

Mr. Phillips builds well locations and roads on oil leases, digs slush pits and handles other dirt-moving jobs for major oil companies in the rugged "four corners" area of the San Juan basin.

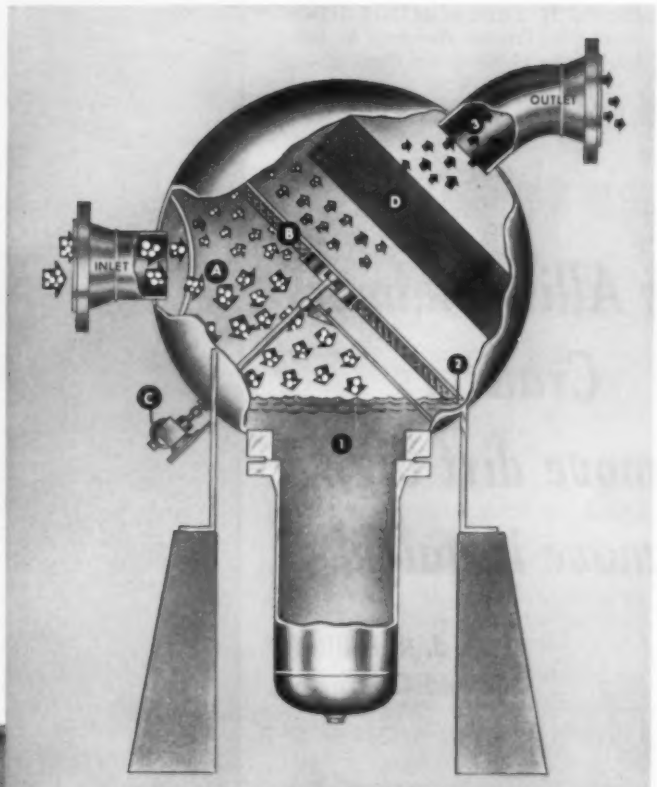
Mr. Phillips is particularly pleased with the Allis-Chalmers truck wheels and support rollers. He states, "They really stand up in tough going." In addition, he feels the main units of the tractors have held up very well under widely varied conditions.

Find out how Allis-Chalmers crawler tractors can help you cut dirt-moving costs. Your Allis-Chalmers construction machinery dealer can give you facts and figures.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

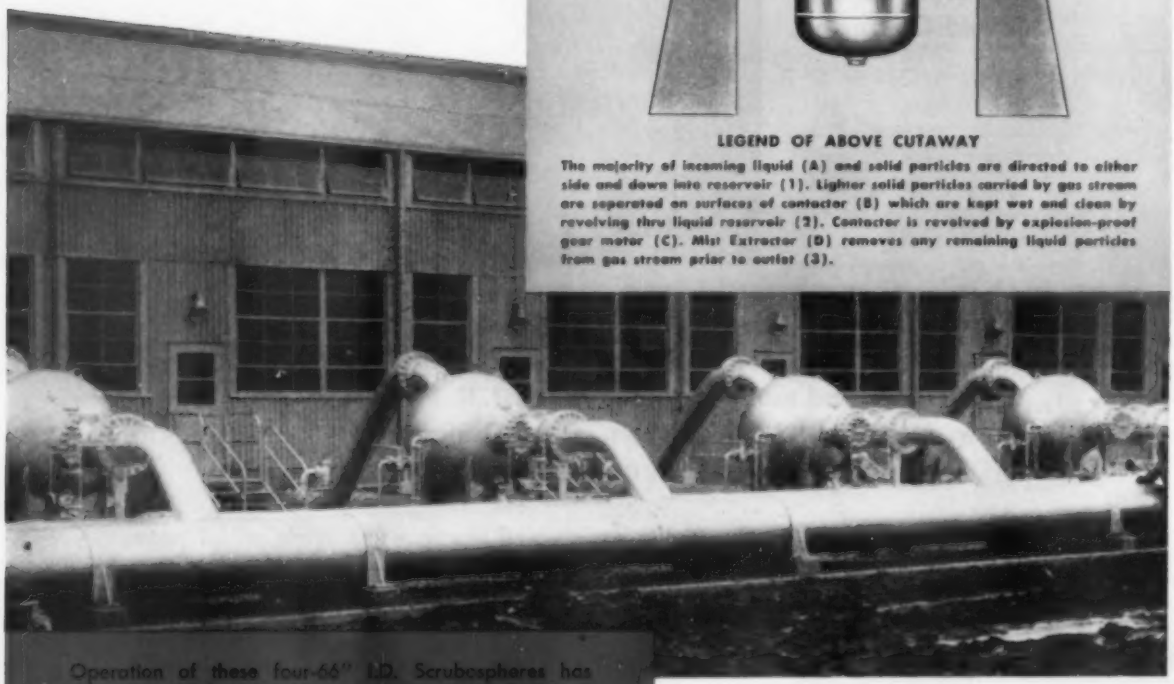
ALLIS-CHALMERS

OPERATION PROVES
It's Cleaner Gas
with
PEERLESS
SCRUBOSPHERES



LEGEND OF ABOVE CUTAWAY

The majority of incoming liquid (A) and solid particles are directed to either side and down into reservoir (1). Lighter solid particles carried by gas stream are seperated on surfaces of contactor (B) which are kept wet and clean by revolving thru liquid reservoir (2). Contactor is revolved by explosion-proof gear motor (C). Mist Extractor (D) removes any remaining liquid particles from gas stream prior to outlet (3).



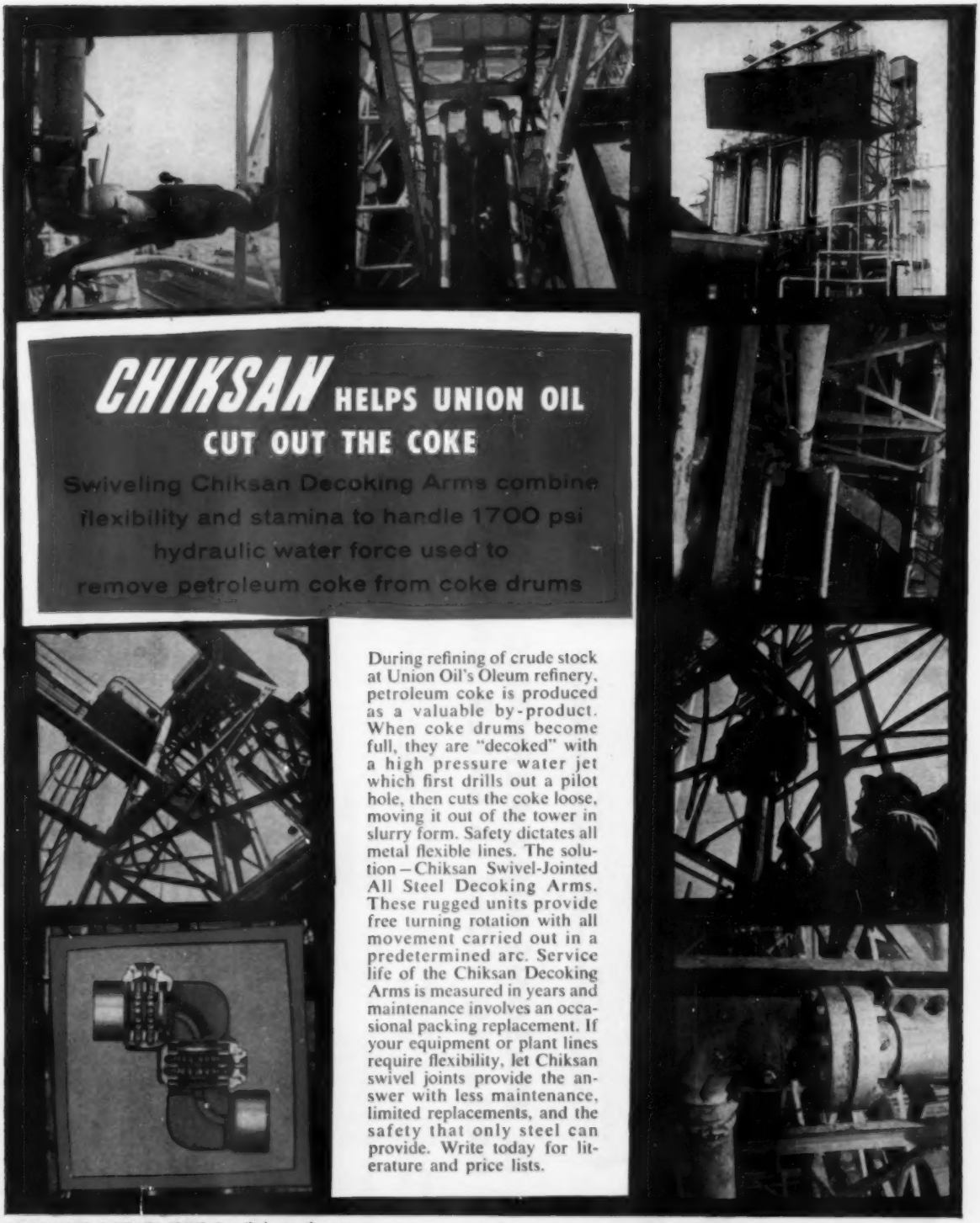
Operation of these four-66" I.D. Scrubospheres has demonstrated their superiority over conventional oil bath dust scrubbers. The dust removal ability of the SCRUBOSPHERE is outstanding because it utilizes wetted surfaces for dust collection which are more closely spaced than in conventional equipment.

Operation of these Peerless units has also proven their superiority with respect to minimum oil loss because oil is periodically removed from the Scrubospheres whereas **it must be periodically added to other scrubbers** in the same plant operating under comparable conditions. (Pat. Applied for).

Let your Peerless Representative give you full details.

PEERLESS MANUFACTURING COMPANY
Walnut Hill Lane at Old Denton Road
P. O. BOX 13165 • DALLAS, TEXAS
Representatives in All Principal Cities

PEERLESS MFG. CO.
DALLAS TEXAS



CHIKSAN HELPS UNION OIL CUT OUT THE COKE

Swiveling Chiksan Decoking Arms combine flexibility and stamina to handle 1700 psi hydraulic water force used to remove petroleum coke from coke drums

During refining of crude stock at Union Oil's Oleum refinery, petroleum coke is produced as a valuable by-product. When coke drums become full, they are "decoked" with a high pressure water jet which first drills out a pilot hole, then cuts the coke loose, moving it out of the tower in slurry form. Safety dictates all metal flexible lines. The solution—Chiksan Swivel-Jointed All Steel Decoking Arms. These rugged units provide free turning rotation with all movement carried out in a predetermined arc. Service life of the Chiksan Decoking Arms is measured in years and maintenance involves an occasional packing replacement. If your equipment or plant lines require flexibility, let Chiksan swivel joints provide the answer with less maintenance, limited replacements, and the safety that only steel can provide. Write today for literature and price lists.

LOOK INSIDE A SWIVEL JOINT. Detailed attention to detail. Precision machining and specific packing seals for specific services. These are the quality-plus features built into every Chiksan Swivel Joint.

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

fmc CHIKSAN

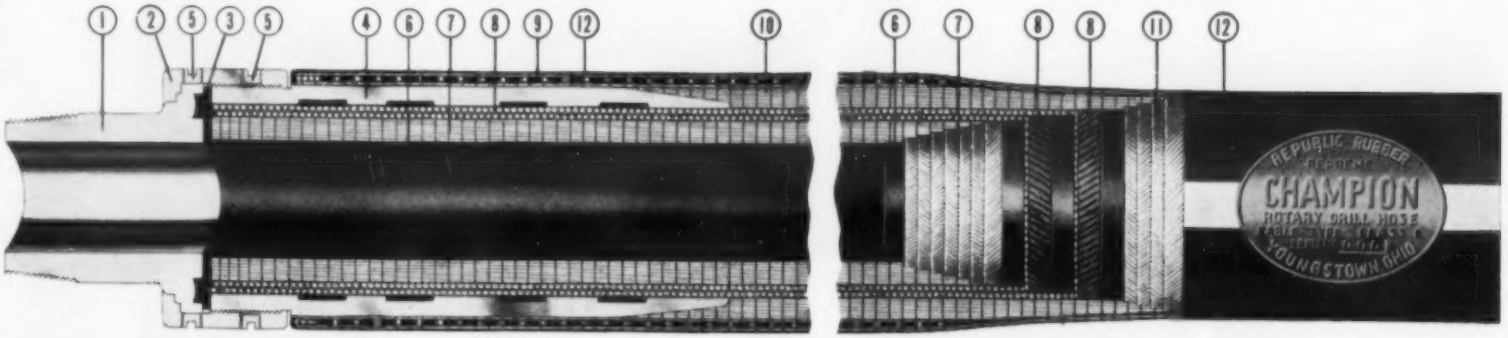
CHIKSAN COMPANY—BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada, Ltd.

Please address DEPT. 31

#57-29

Here's the INSIDE STORY...



12 REASONS WHY REPUBLIC CABLE-TYPE ROTARY DRILLING HOSE IS SAFER AND LONGER LASTING

1. **Nipple Head** of tough alloy steel will give maximum service. Standard A.P.I. threads.
2. **Collar** firmly attached to couplings. Will stay put.
3. **Sealing Gasket** specially compounded. Seals pressure in.
4. **Republic Couplings** give you a hose with no weak spots. In ordinary rotary hose, reinforcing wires or cables are placed over the couplings. Spacing between wires must be widened since O.D. of hose and coupling combined is greater than hose itself. These gaps create a weak spot at a critical point. Republic's new coupling design keeps the wire cable snugly and evenly spaced against the hose all the way and underneath the couplings . . . giving uniform strength the entire length of the hose and still maintaining the important full-flow feature.

THERE IS NO WEAK POINT IN A REPUBLIC ROTARY HOSE.

5. **Set Screws** prevent loosening of collar and nipple head.
6. **Hot Oil & Abrasion-Resistant Reprene Tube** resists wear of corrosive drilling muds, withstands swelling and softening effect of oil.
7. **Multiple Fabric Plies** give greater resistance to pressure.
8. **Steel Cables** imbedded in rubber guarantee strength and reduce pulsation and vibration during pressure surges.
9. **Circumferentially-Wound Steel Cable** reinforces ends and prevents kinking at these critical spots.
10. **End Reinforcing Fabric Plies** work with the steel cables discussed in No. 9 to give even greater insurance against kinking and breaking at the vital hose ends.
11. **Additional Fabric Plies** give extra strength and permanently anchor reinforcing cables in place.
12. **Extra Tough Reprene Cover** will resist cutting, abrasion, and weathering. Oil resistant.

CLASS C

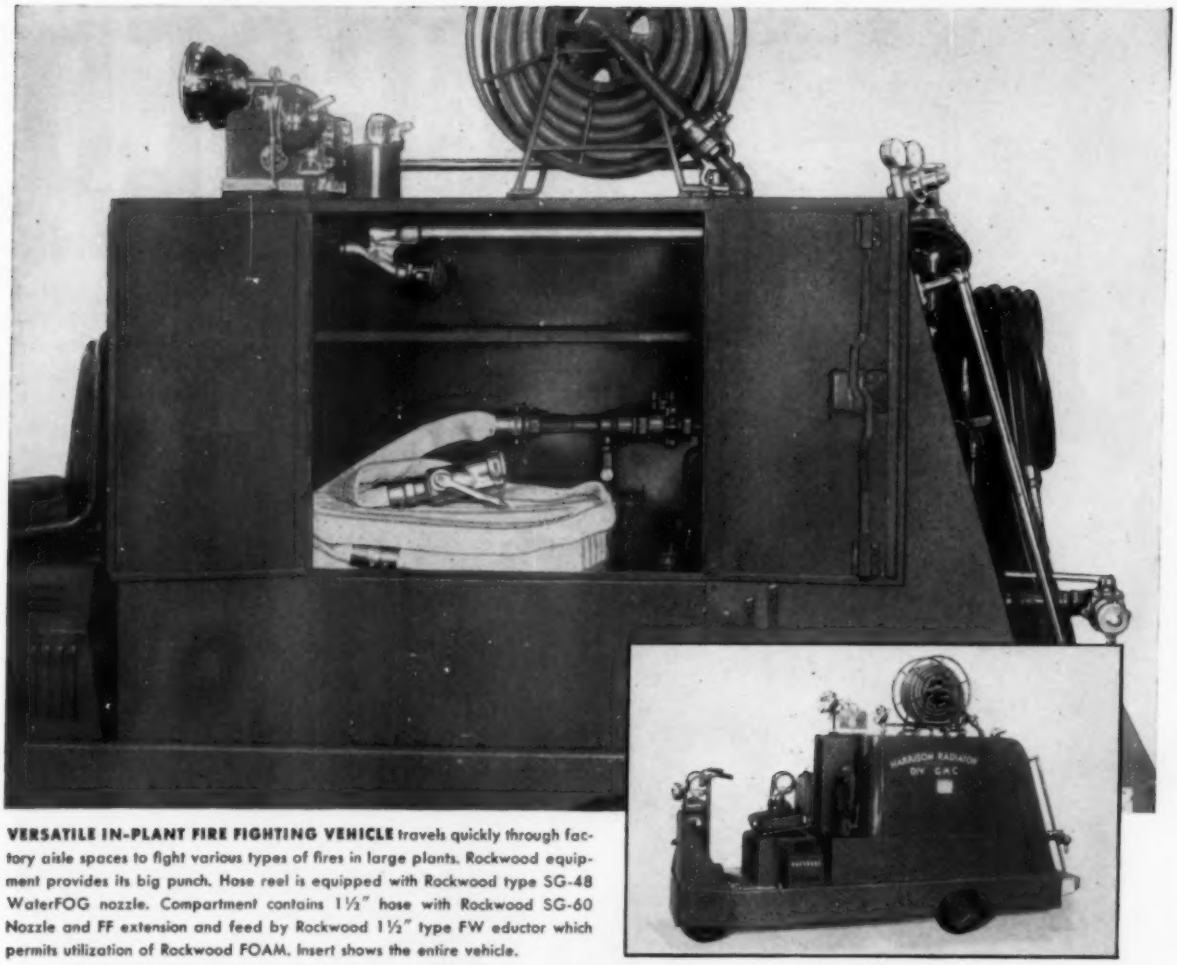
Each Length tested to 5,000 lbs.

THERE'S NO BETTER HOSE MADE!

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

INDUSTRIAL RUBBER PRODUCTS



VERSATILE IN-PLANT FIRE FIGHTING VEHICLE travels quickly through factory aisle spaces to fight various types of fires in large plants. Rockwood equipment provides its big punch. Hose reel is equipped with Rockwood type SG-48 WaterFOG nozzle. Compartment contains 1½" hose with Rockwood SG-60 Nozzle and FF extension and feed by Rockwood 1½" type FW eductor which permits utilization of Rockwood FOAM. Insert shows the entire vehicle.

The Inside Story of the Potent "Youngster"—a New In-Plant Fire Fighter

The Young Fire Equipment Corporation of Buffalo, New York, made this vehicle an even more potent fire fighter by installing Rockwood fire prevention equipment.

Here's How It Works

Rockwood FOAM is automatically proportioned (97 parts water to three parts FOAM) and introduced into the hose line by the Rockwood FW eductor. The Rockwood SG-60 WaterFOG nozzle fights fire five ways — by means of a solid water stream high-velocity WaterFOG, low-velocity WaterFOG from applicator, and from FF extension inserted in nozzle, a wide angle FogFOAM pattern and a solid FOAM stream.

Send For Full Information

Rockwood's wide variety of fire fighting equipment is engineered to quickly, safely control fires. Fill in the coupon below now.

Tested and listed by Underwriters Laboratories, Inc. Distributors in all principal industrial areas.

ROCKWOOD SPRINKLER COMPANY

Engineers Water . . . to Cut Fire Losses

Distributors in all principal industrial areas

ROCKWOOD SPRINKLER COMPANY
Portable Fire Protection Division
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Worcester 5, Mass.

Please send me your illustrated booklet on Rockwood fire fighting products.

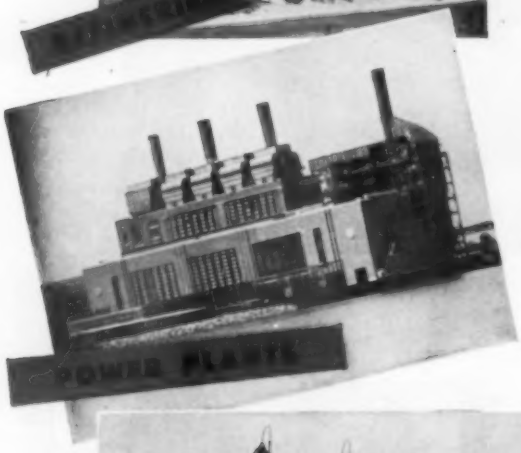
Name .....

Title .....

Company .....

Street .....

City ..... *Zone* ... *State* .....



RUGGED

VOGT equipment is

One of the chief reasons why Vogt equipment is used by so many of the nation's key industries is the close working co-operation of Vogt engineers with the customer in determining his requirements. The result is an extraordinary ability to produce mechanical designs which, when translated into the finished product, most economically meet the required needs.

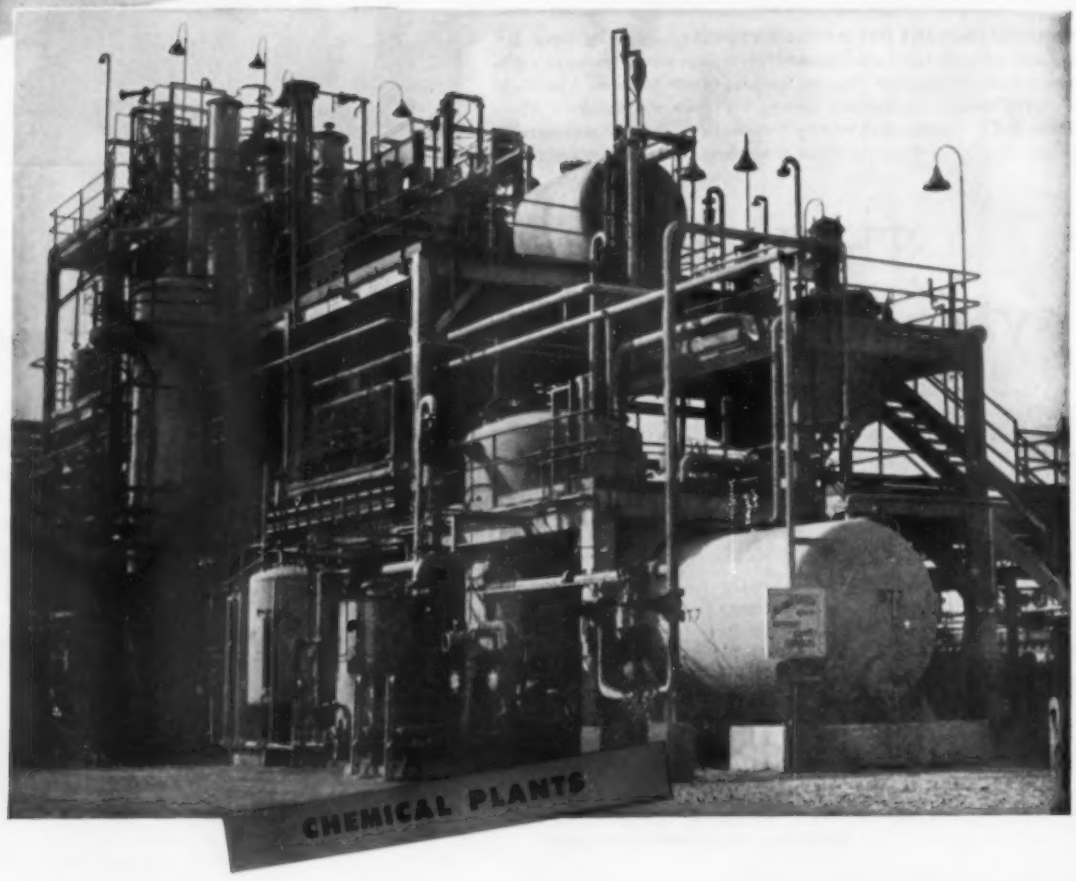
Performance on the job proves, too, that the care and rigid tests and inspections given every Vogt product pay off in low maintenance costs.

Specify Vogt and be sure of equipment which will meet today's toughest service demands.

Write Dept. 24A-GO for catalogs

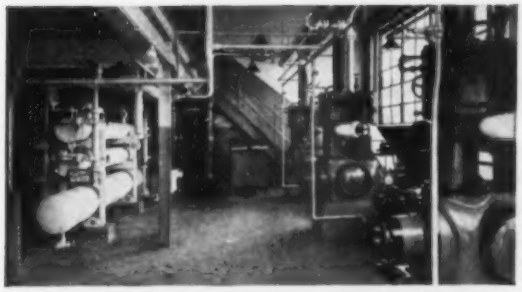
HENRY VOGT MACHINE CO., LOUISVILLE, KENTUCKY

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, CLEVELAND, ST. LOUIS, DALLAS, CINCINNATI, CHARLESTON, W. VA.



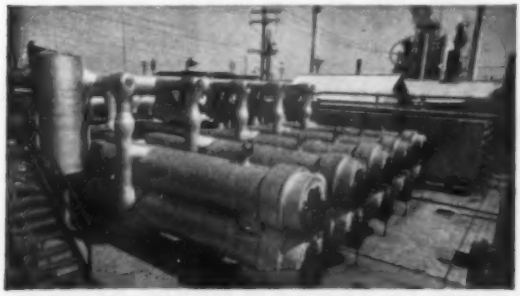
and RIGHT!

used and trusted by the nation's key industries



REFRIGERATION AND ICE MAKING EQUIPMENT

Widely employed in industry for important process work. Compression refrigeration systems, also Tube-Ice units, are available in a wide range of capacities.

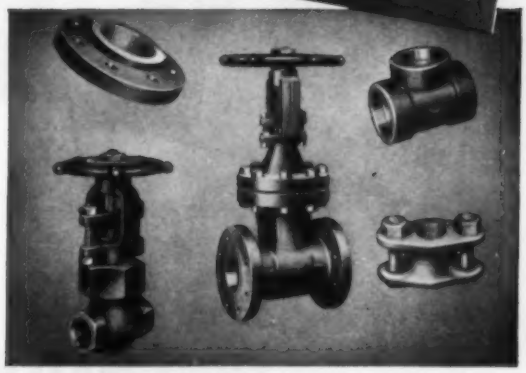


PROCESS EQUIPMENT FOR EVERY SERVICE

Constructed in wide variety to meet all Code requirements. Stills and towers, oil chillers, crystallizers, heat exchangers, molding machines, etc., serve in the manufacture of oils, greases, high octane gasoline, synthetic rubber, chemicals and related products.

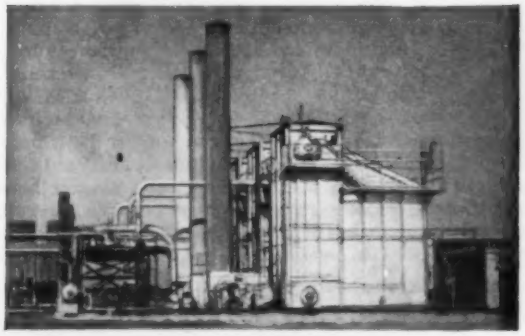
SPECIAL CORROSION RESISTANT MATERIALS

Vogt produces a wide variety of equipment from special metals and alloys to fight corrosion and product discoloration or contamination. Corrosion resistant properties of welds match that of the materials used to construct the equipment.



DROP FORGED VALVES, FITTINGS AND FLANGES

Vogt valves, fittings and flanges are drop forged from carbon and alloy steels to safely handle liquids and gases at high pressures, and high temperatures. Complete line includes: flanged, screwed and socket weld end globe, gate and check valves. Also ells, tees and crosses—couplings—bushings—plugs—unions—flanges and flange unions, and welding heads.



MODERN STEAM GENERATORS

Custom built and package type Vogt steam generators give maximum rating in a minimum of space with high efficiency and low maintenance costs. Available in bent tube and straight tube designs for solid, liquid or gaseous fuels, burned singly or in combination to meet every power, processing or heating requirement.

CONDOR LS* V-BELTS
COME MATCHED—STAY MATCHED!

***LENGTH STABILIZED . . .** Raybestos-Manhattan announces the most important advance in rig drive V-belt design and engineering. It's the new—*all* new—Condor LS Belts specially developed to outperform any other V-belt on long center, heavy duty drives.

Top to bottom, every part of the new Condor LS Belt has been engineered to eliminate belt whip, wobble, and weave . . . and minimize stretch . . . common causes of undue stress and belt turnover that lead to eventual failure with ordinary long center belts. R/M specialists have developed a new "stabilized" compression section . . . repositioned the belt strength member . . . to provide a degree of lateral *and* longitudinal stability *without stretch* never before possible. This means *positive* belt length control, *smoother* running, *longer* belt life . . . even where belts must take the reverse bends of idler pulleys! It means "More Use per Dollar" for every inch of drive.

ONLY CONDOR LS BELTS ARE VACUUM PACKAGED FOR POSITIVE MATCHING

Each Section C and Section D long length Condor LS Belt is factory measured under controlled humidity . . . length certified and tagged . . . then heat sealed *under vacuum* in aluminum-lined, moisture-proof bags. This keeps your V-belts *factory fresh* to assure maximum protection against oxidation by ozone, or sun, heat or dust during storage. Therefore, each belt reaches your drive length-certified for quick, *positive* matching. Condor LS Belts come matched and *stay* matched on your drive.

Stabilized construction *plus* vacuum packaging add up to a new high standard of rig drive performance. Ask your R/M representative about *new* Condor LS Belt for your drive today . . . or write for Bulletin #M 210.

BELTS • HOSE • ROLL COVERINGS • TANK LININGS • INDUSTRIAL RUBBER SPECIALTIES

R/M

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YOU CAN SAVE... time, labor and money BY CONVERTING your hand-operated valves...

TO LimiTorque®

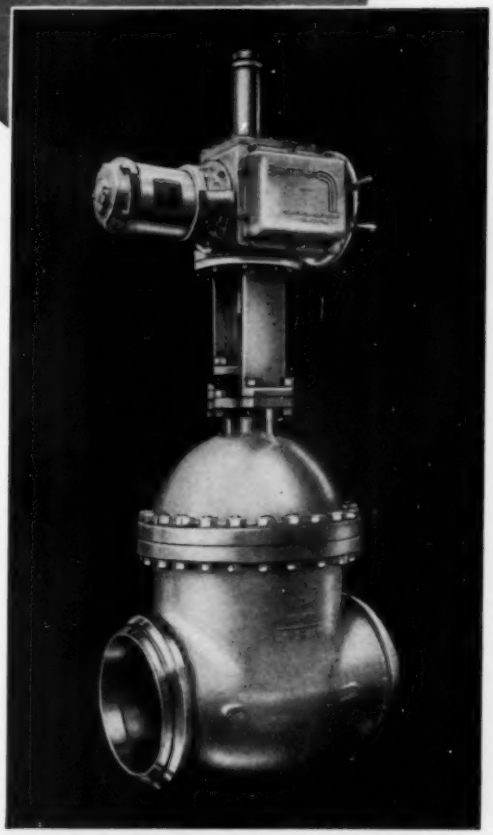
Trouble-Free Motorized Valve Operation

Why not be modern and thrifty too,—follow the example of hundreds of plants of all types. *Convert* your present hand-operated valves to LimiTorque "push-button control"—*save time, labor and money.*

In most instances, LimiTorque conversion requires only minor changes to the valve. Your LimiTorque Valve Operators can be furnished as a completely packaged unit including electrical controls and push button. Simply wire the power leads to your source of electricity.

With LimiTorque, one finger does the work of many hands, by permitting key personnel to operate, and know the exact position of each valve from a centrally located control panel.

In addition, LimiTorque protects seats, discs and stems from damage, by automatically shutting-off power source should an obstruction interfere with valve closing. LimiTorque-operated valves are always seated tightly because the valve disc seating thrust is accurately maintained in each closing-cycle, through a micrometer-adjusted torque limiting mechanism.



LimiTorque can be field-mounted on your existing valves—contact your valve manufacturer or nearest LimiTorque sales-engineering office.

Send for complete new Catalog L-550, on your business letterhead.

LimiTorque®

PHILADELPHIA GEAR WORKS, INC.
ERIE AVE. & G STREET, PHILADELPHIA 34, PENNA.
Offices in all Principal Cities

INDUSTRIAL GEARS & SPEED REDUCERS • LIMITORQUE VALVE CONTROLS • FLUID MIXERS • FLEXIBLE COUPLINGS

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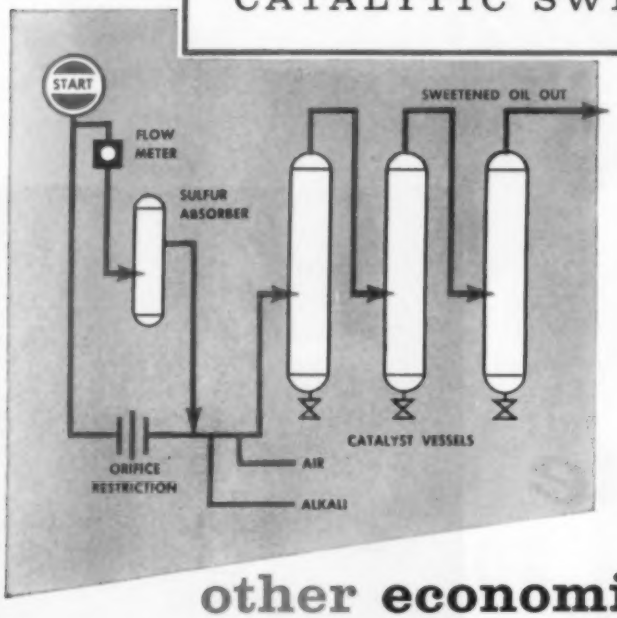
only 20% of the operating costs of conventional doctor treating!

PETRECO-BENDER
CATALYTIC SWEETENING PROCESS

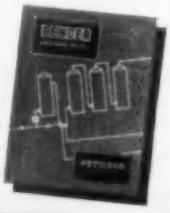


In the Petreco-Bender Process chemical costs are often 80% less than with conventional sweetening . . . the normal sulfur requirements are less than for doctor treating, and just enough alkali is needed to maintain a slightly alkaline distillate. Normal catalyst life is about 12 months before regeneration is required, and it can be done economically at the plant site.

. . . and there are other economic advantages:

- **No volume loss.**
- **Low Operating Cost.** Entire chemical cost of the Petreco-Bender Process is often less than cost of utilities alone in conventional sweetening.
- **No Regenerator Effluent to Dispose of; No Blackstrap; No Air Pollution.**
- **Automatic and Continuous Operation.**
- **A Better Product.** Use of less sulfur means a sweet, non-corrosive product.

FREE ILLUSTRATED BULLETIN
. . . Available to you on request.



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A DIVISION OF PETROLITE CORPORATION

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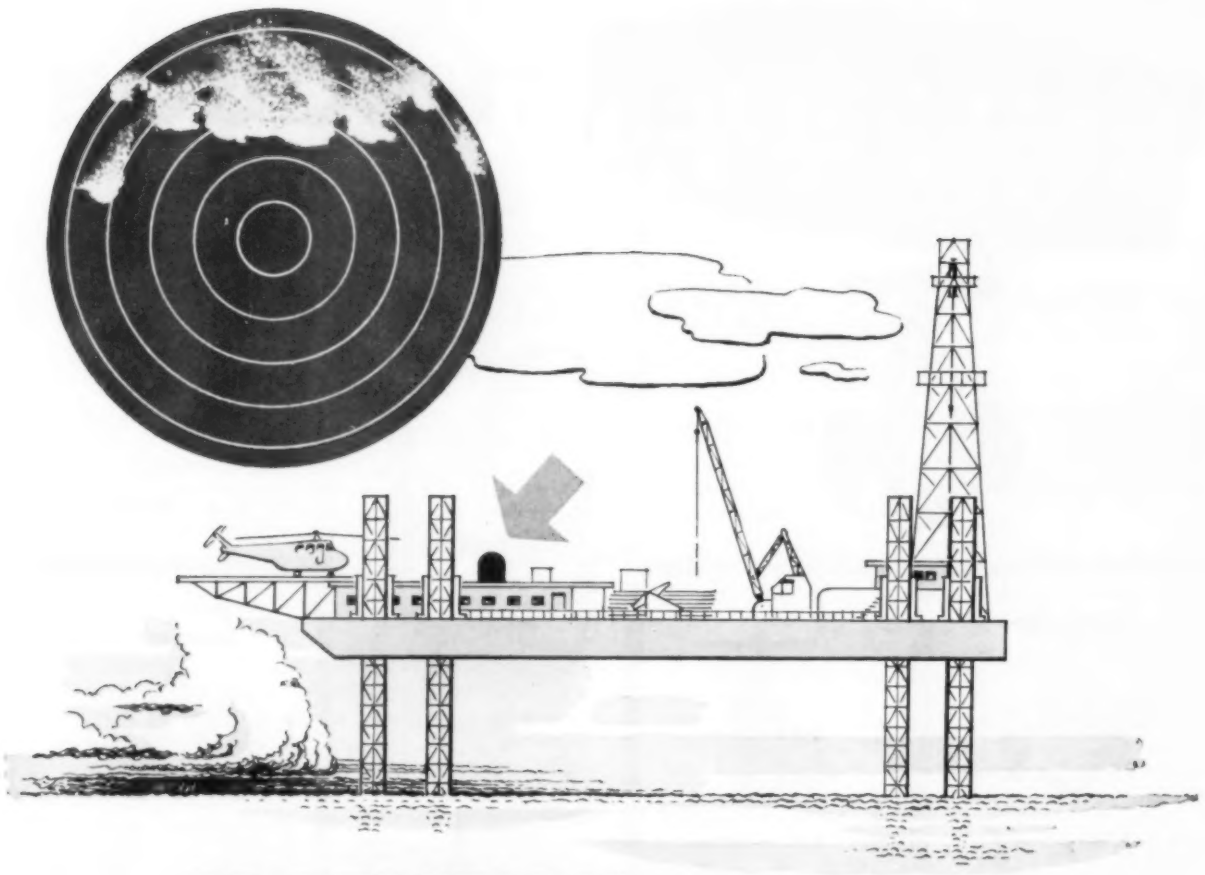

PROTECTION *from the elements*

FOR OFF-SHORE DRILLING OPERATIONS

The ability to immediately and accurately evaluate storms as they approach from many miles in the distance is far superior to attempts at outguessing the weather. RCA's Ground Weather Radar makes possible reliable decisions as to whether operations should cease. The extent of lashing down activities and other precautions can be determined and need not be accomplished unless or until necessary, avoiding expensive shutdown of off-shore operations such as drilling rigs. Radar provides a basis on which new operating economies can be effected.

RCA engineers are at your service for complete information about the RCA Ground Weather Radar. Address:

RADIO CORPORATION of AMERICA

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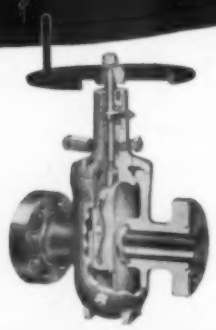
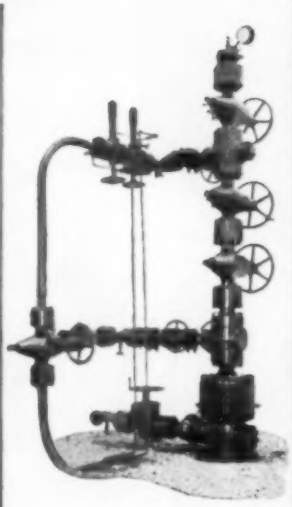
W-K-M® THROUGH

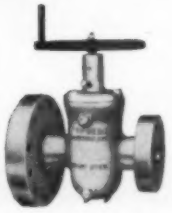




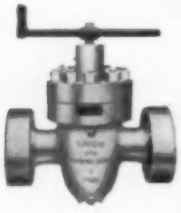
Screw-End Valves
Size: 2"
500 lbs. and 800 lbs. Working Pressure

Flanged Valves
Sizes: 2", 2½", 3" and 4"
1000 lbs. thru 5000 lbs. Working Pressure

Screw by Flange Valves
Sizes: 2", 2½", 3" and 4"
1000 lbs. thru 5000 lbs. Working Pressure



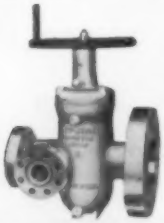
Unequal Flange Valves
Sizes: 2", 2½" 3" and 4"
1000 lbs. thru 5000 lbs. Working Pressure



Bolted Bonnet Valves
Size: 4"
10,000 lbs. Working Pressure

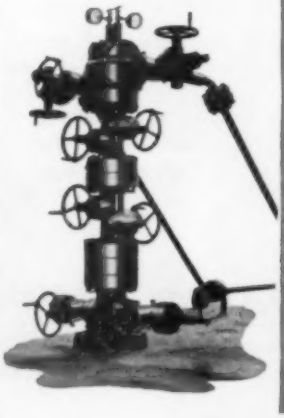
Balanced Stem Valves
Sizes: 2", 2½", 3" and 3½"
10,000 lbs. Working Pressure
Sizes: 1⅜", 1⅝", 2 1/16" and 2⅜"
15,000 lbs. Working Pressure

Cross Type Valve (4" cross)
Sizes: 6" x 6" and 6" x 7"
2000 lbs. thru 5000 lbs. Working Pressure



Unequal Flange Cross Type Valves (2" cross)
Sizes: 2", 2½", 3", and 4"
2000 lbs. thru 5000 lbs. Working Pressure

Recessed Body Valves
Sizes: 1½", 1¾", 2", 2½" and 3"
2000 lbs. thru 5000 lbs. Working Pressure



Drilling Valves
Sizes: 6" x 7" and 6"
2000 lbs. thru 5000 lbs. Working Pressure

CONDUIT GATE VALVES

FOR

EVERY PRODUCTION SERVICE

A wide range of sizes . . . working pressures from 500 to 15,000 pounds . . . flange, unequal flange, screw or screw by flange end connections . . . multiple zone completion valves and cross type valves give you the *right* choice in a W-K-M Valve for every well completion job. Easy operation, DOUBLE-TIGHT SEAL, long life and positive CONTROLLED FORCE SEATING make W-K-M Valves the safest and most economical to use in the oil field.

You receive two special benefits from the parallel expanding gate feature of W-K-M Valves. When the valve is being opened or closed, the gate and segment are contracted together by a powerful spring to allow a slight clearance between them and the body seats for easy operation. After the gates have reached the opened or closed position, the gate and segment expand with CONTROLLED FORCE SEATING against both the upstream and the downstream seats.

Acid and alkali resistant Teflon† inserts in the seat rings give DOUBLE-TIGHT SEALING to control the lightest of gases or the heaviest of crudes.

All standard W-K-M Valves have full-bore through conduits without crevices or other flow obstructions to cause turbulence and pressure loss. Special reduced port valves are available which provide all the advantages of standard valves, except that the conduit is of venturi design to permit a smooth flow transition with a minimum of pressure drop.

SUPERIOR FEATURES—STANDARD ON W-K-M

• Through-Conduit • Parallel Expanding Gates give CONTROLLED FORCE SEATING • Teflon seat inserts for DOUBLE-TIGHT SEAL • Two Thrust Roller Bearings • Pressure Seal Bonnet • Enclosed Packing Gland • Superfinished Stems • Fully Repairable while Installed*

Design and operating advantages, as well as sizes and dimensions of all valves are contained in W-K-M Catalog 200. Address Dept. A-127 for your copy.

W-K-M

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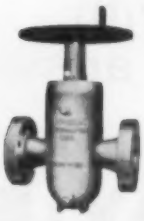
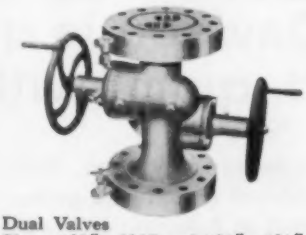
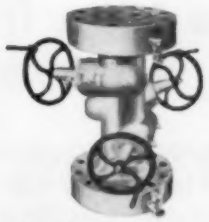
MANUFACTURERS OF W-K-M GATE VALVES · ACF LUBRICATED PLUG VALVES · KEY-KAST ALLOY STEEL PIPING FITTINGS · KEY RETURN BENDS AND FITTINGS



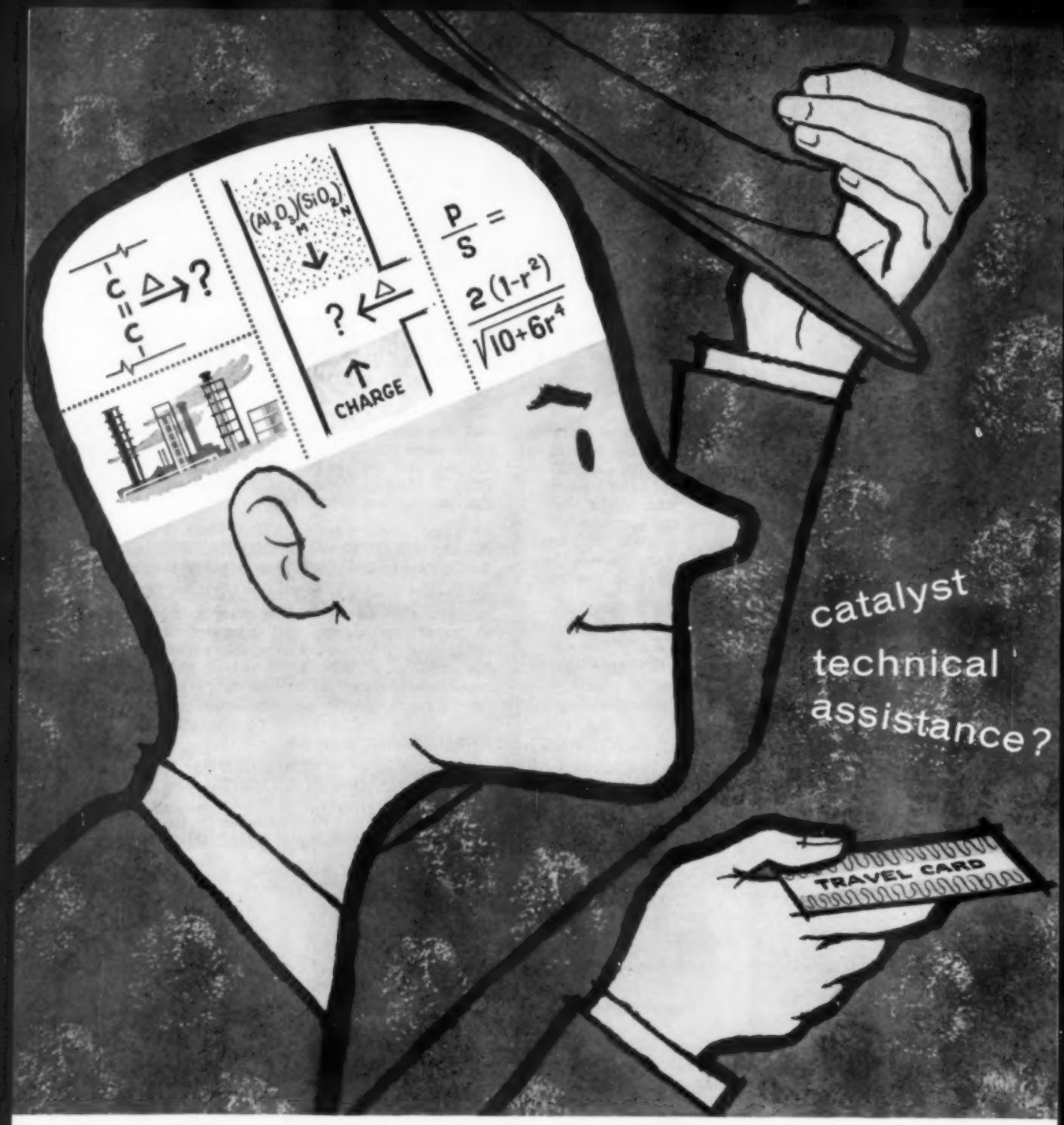
Reduced Port Valves
Size: 2" x 1⅛"
5000 lbs. Working Pressure



Dual Valves
Sizes: 1½" x 1½" and 1¾" x 1¾",
2" x 2", 2" x 2½", 2½" x 2½",
2½" x 3", 3" x 3"
2000 lbs. thru 5000 lbs.
Working Pressure



Triple Valves
Size: 2" x 2" x 2"
2000 lbs. thru 5000 lbs.
Working Pressure



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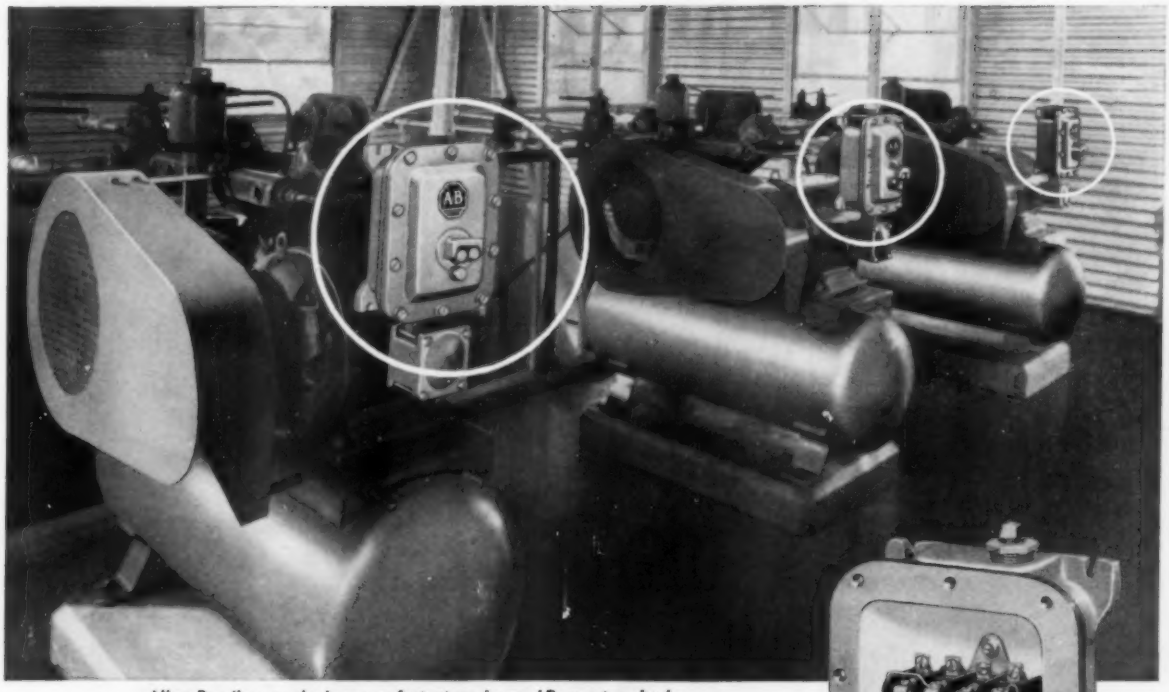
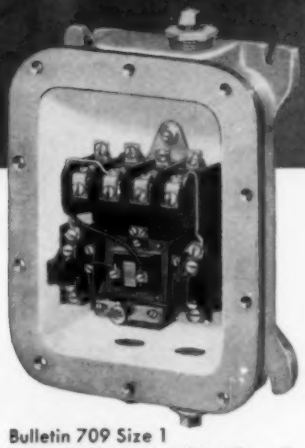


Allen-Bradley explosion-proof starters in an LP gas terminal.

Don't waste time removing covers!

Allen-Bradley starters are good for millions of operations . . . without maintenance



Bulletin 709 Size 1
Solenoid Starter in NEMA Type 7
explosion-proof enclosure.

Type 1 General Purpose Enclosure

Type 4 Watertight Enclosure

Type 8, Oil-Immersed for Hazardous Corrosive Gas

Type 9, for Hazardous Dust

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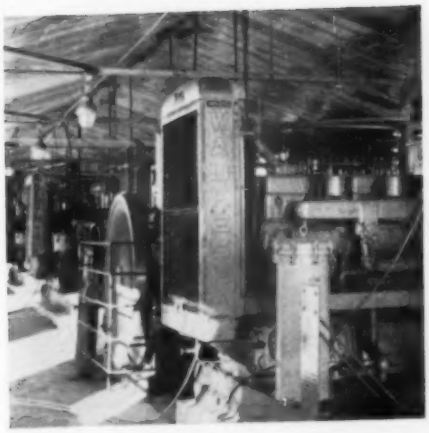

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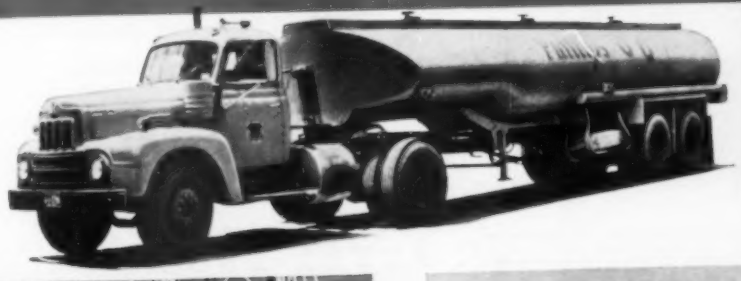

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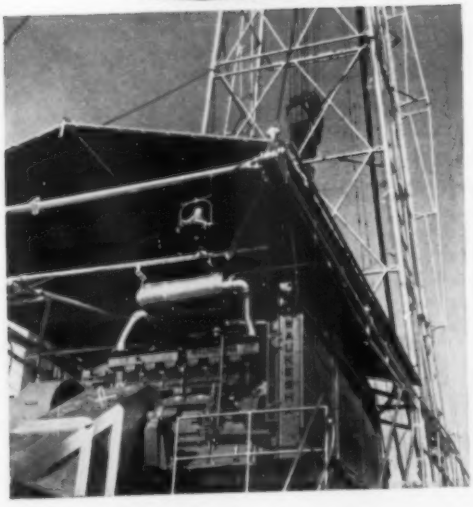

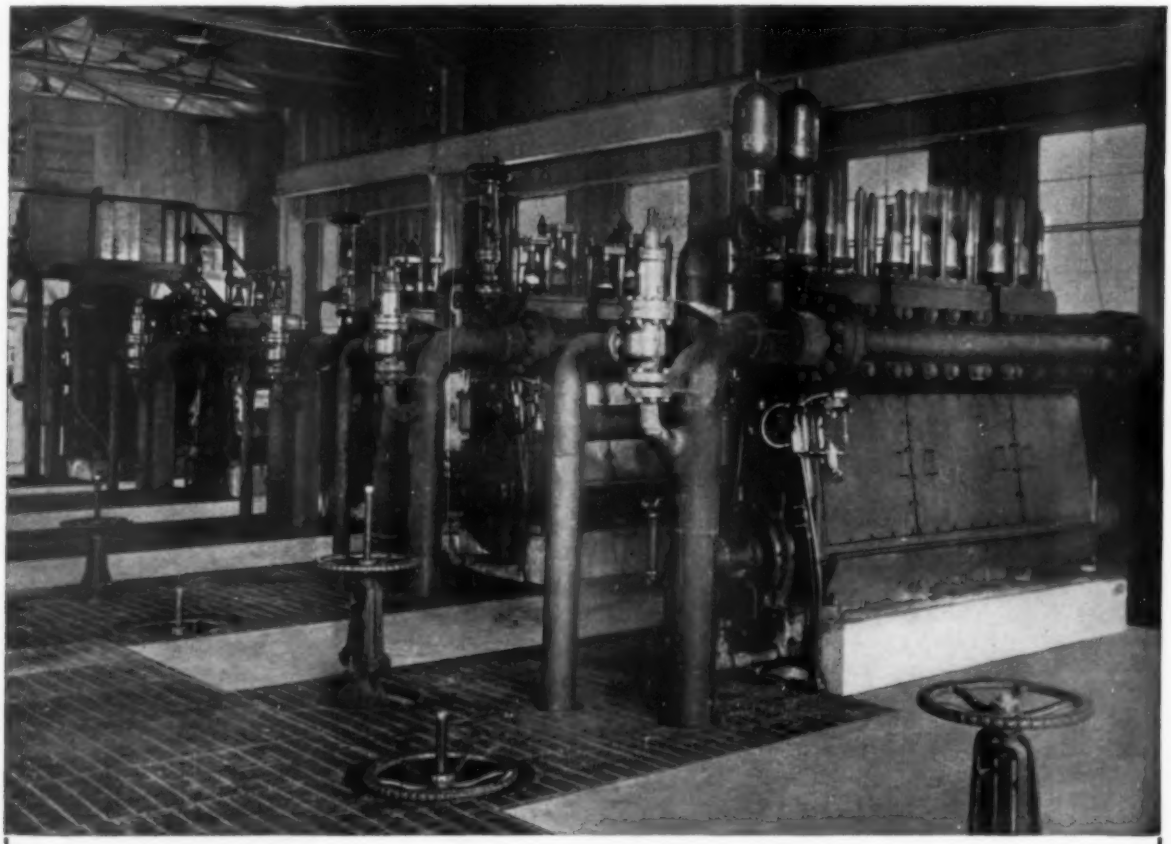

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PUMPS: 10 Aldrich Pumps

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FLOODING STARTED: April 1953

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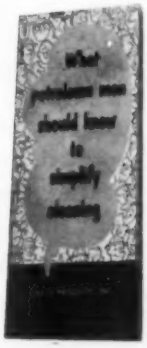

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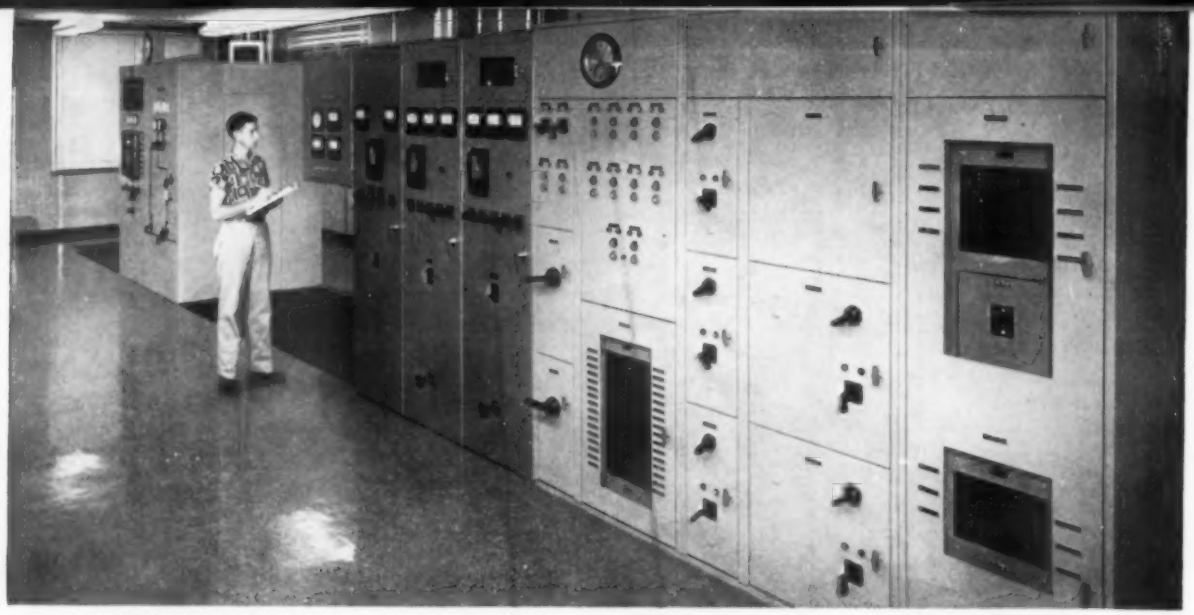

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AT TENNESSEE GAS TRANSMISSION COMPANY . . .

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SAVINGS on installation, maintenance, and operating costs were the result of close co-operation between Tennessee Gas Transmission Company personnel and General Electric engineering services.

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FROM DESIGN STAGES through application engineering, manufacture, installation, and operation, General Electric's wide experience in this field was utilized by TGT. The result was a drive system that exactly meets the particular station requirements of TGT.

DEPENDABILITY of all General Electric station and auxiliary equipment means a big dollar savings in terms of costly space, stand-by units, and emergency downtime.

TO HELP SOLVE YOUR STATION DRIVE REQUIREMENTS, General Electric makes available to you these complete engineering services. As with the Tennessee Gas Transmission Company installation, G-E engineers will co-operate closely with you in helping to design and install the drive system that exactly meets your station requirements. Get complete information from your nearest General Electric Apparatus Sales Office and meanwhile write for Bulletin GEA-6401, Combustion Gas Turbines, to General Electric Company, Section 661-56, Schenectady, N.Y. *Reg. trade-mark of General Electric.

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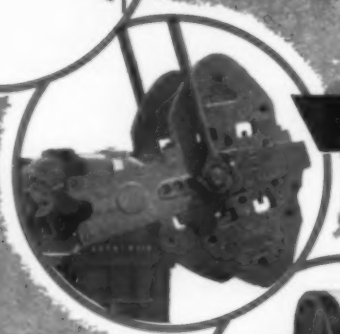

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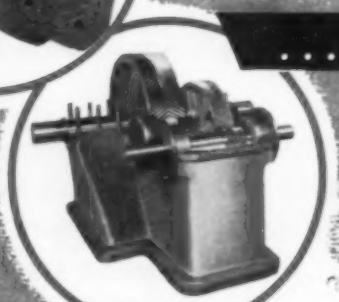

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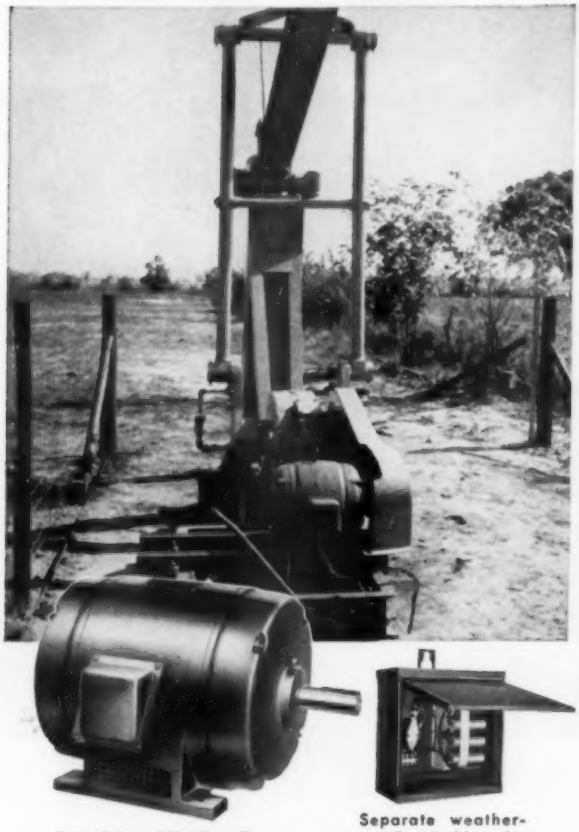
These Wagner Motors are designed to

Cut Operating Costs

in the oil fields



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Separate weatherproof control box, for use with single phase motors.

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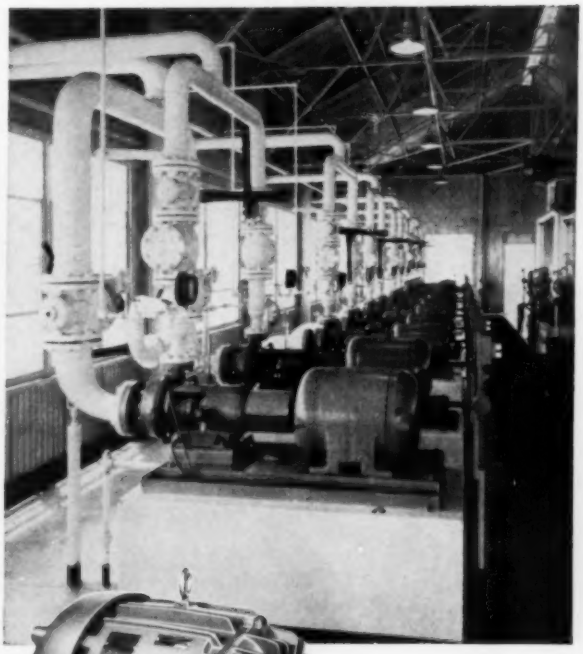
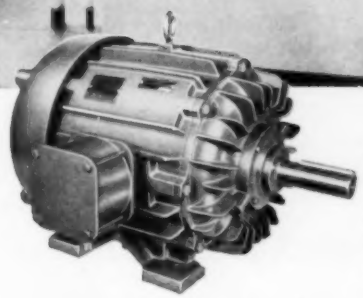
in the refinery





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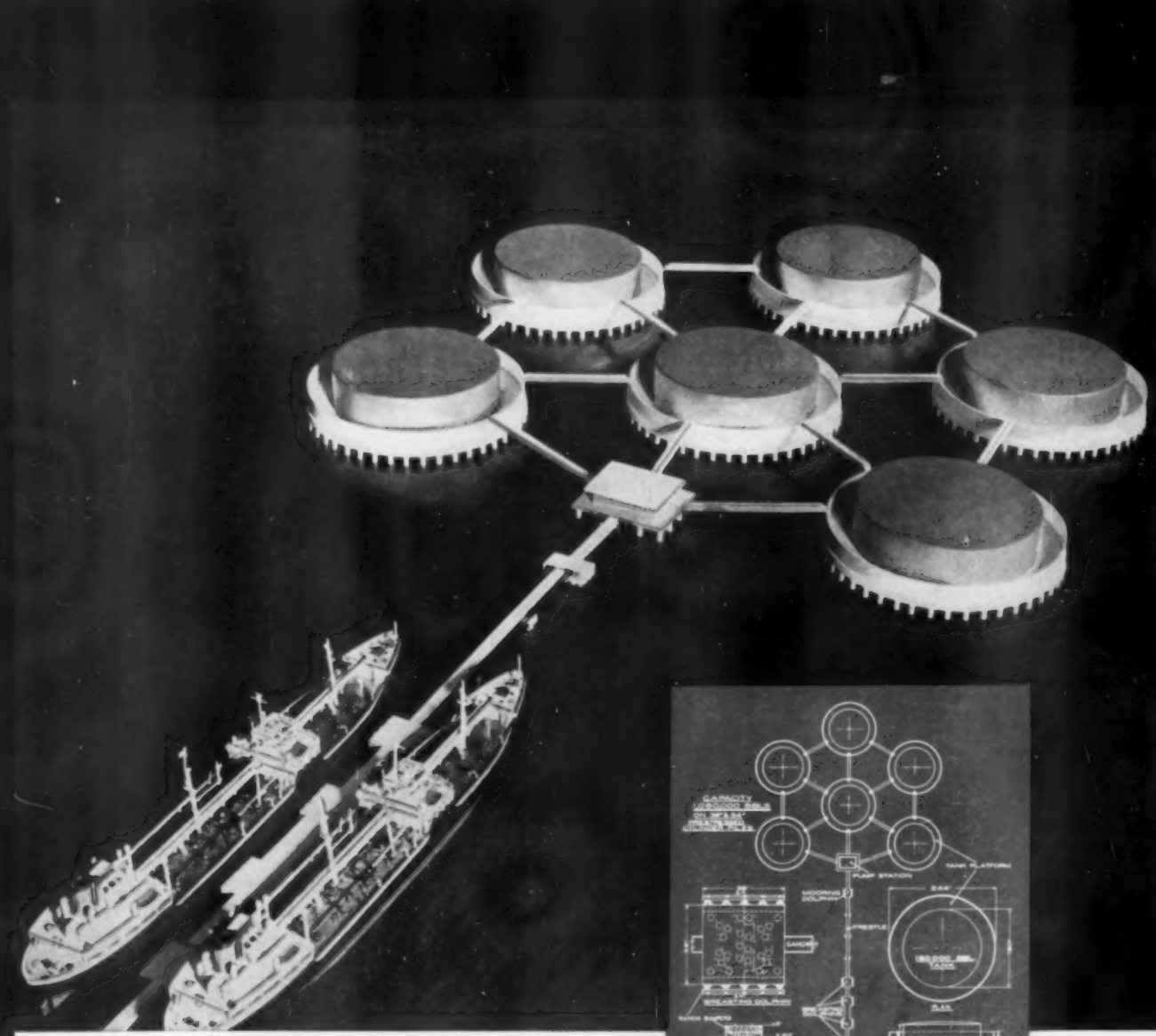

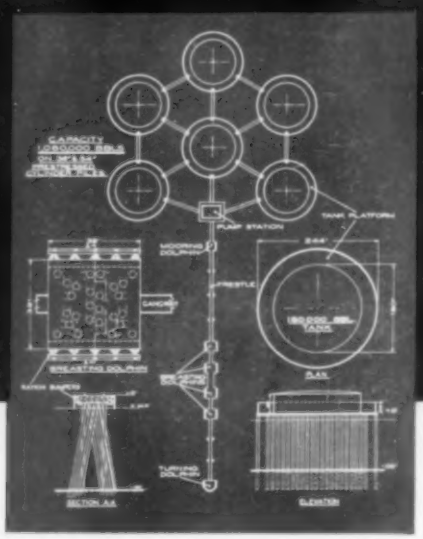

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Industry Standard for Lower Maintenance Costs

LQ600®

Here's Why: Long accepted valve maintenance costs are a thing of the past in thousands of plants where LQ600's have been installed . . . even in the most severe services where previous valves required repair or replacement after as little as two weeks on the line.

These outstanding savings are made possible by seats and discs of Brinalloy®, a patented Lunkenheimer alloy that is more resistant to wear and corrosion than 500 Brinell Stainless or 1000 Brinell Case-Hardened Stainless Steel.

Add to this the Lunkenheimer exclusive silicon-bronze Stemalloy®, the most durable stem material ever put into a valve, and you have two important reasons why LQ600's have established new low-maintenance standards everywhere they are installed.

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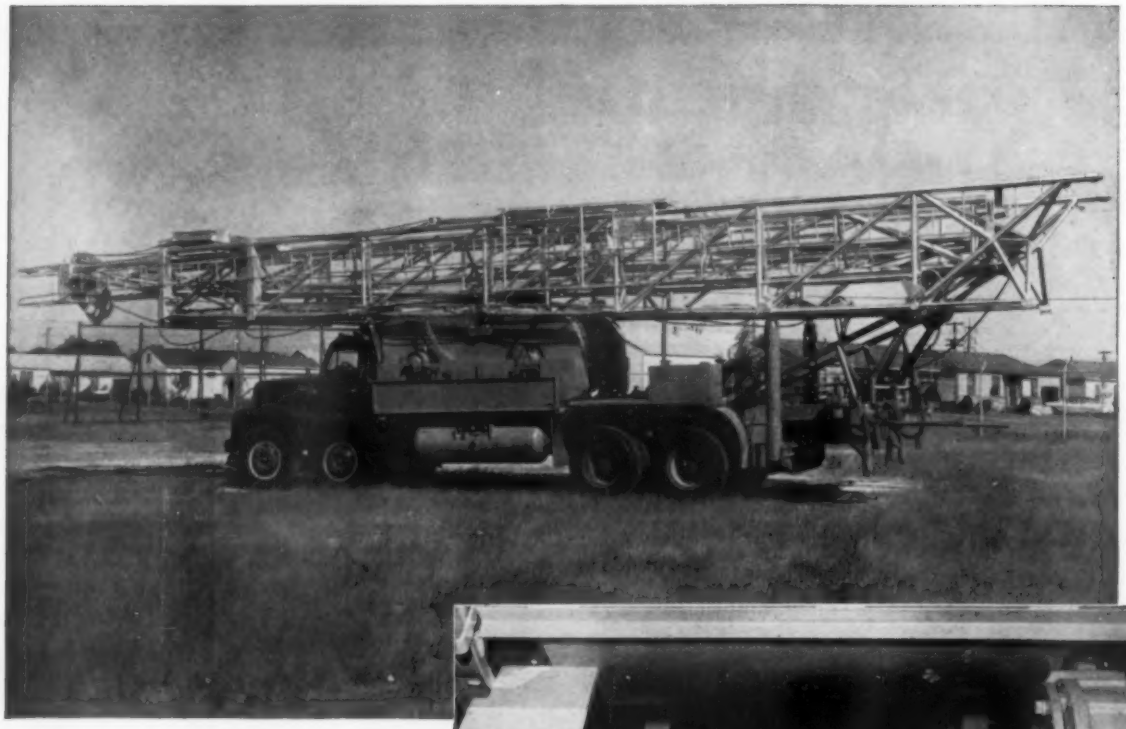

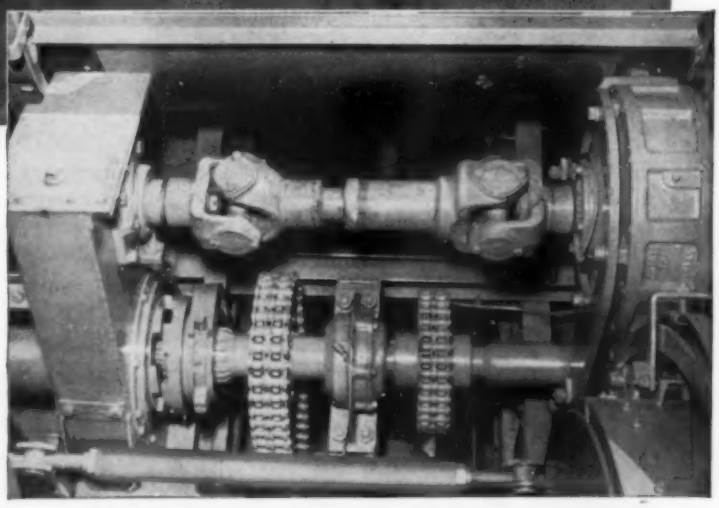

Driving the draw-works—
Rex Roller Chain.

REX®

Roller chain on the Franks Rocket Rig

Have a look inside this Franks Rocket Rig (Franks Division, Cabot Shops, Inc., Drawer 3216, Whittier Station, Tulsa). You'll see Rex Roller Chain driving its draw-works.

Why Rex? Rex pitch control assures equal load distribution over all parts—and greatly extended chain life. Rex manufacturing has added tremendous strength at the pin holes. Rex glide-fit design makes assembly and disassembly fast and easy.

Why Rex? It's the very best of all the good roller chains—best design, best materials, best manufacture to the precision tolerances needed to keep your rig running around the clock.

CHAIN Belt Company, 4619 West Greenfield Avenue, Milwaukee 1, Wisconsin.

CHAIN BELT COMPANY

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Oil Field Offices: Dallas • Houston • Los Angeles • Odessa • Oklahoma City • New Iberia • New York
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TOPS IN SPUDDERS *plus*
unmatched quality in service

More and more experienced drillers throughout the country are buying Bucyrus-Erie spudders because they know they're getting a machine with a proved profit-making record on a variety of drilling and servicing jobs. Among the features that contribute to this outstanding spudder performance are: fine engineering, rugged structural design; durable, long-life construction; good mobility; sharp, snappy spudding action; and day-in, day-out dependability.

AND BUCYRUS-ERIE'S "AFTER-THE-SALE" BONUS — PROMPT, EFFICIENT SERVICE — KEEPS THESE MACHINES IN TOP OPERATING CONDITION.

Distributors, located near all major oil fields in the United States and Canada, are well stocked with Bucyrus-Erie parts and tools and well staffed to help with spudder needs. And Bucyrus-Erie's own factory-trained operating engineers are available for on-the-job service.

Get a quality machine backed by unmatched quality in service. See your Bucyrus-Erie distributor for the full story. 46557

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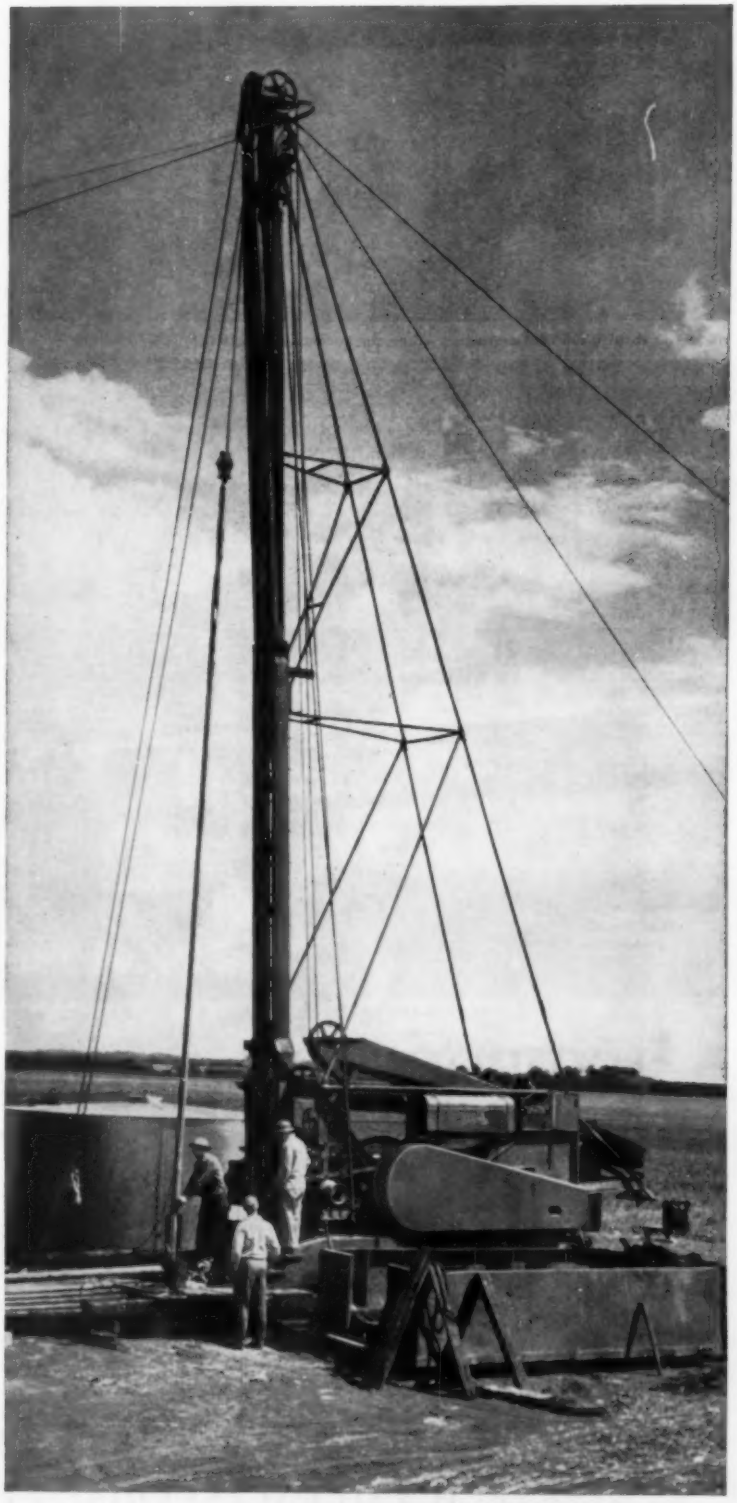
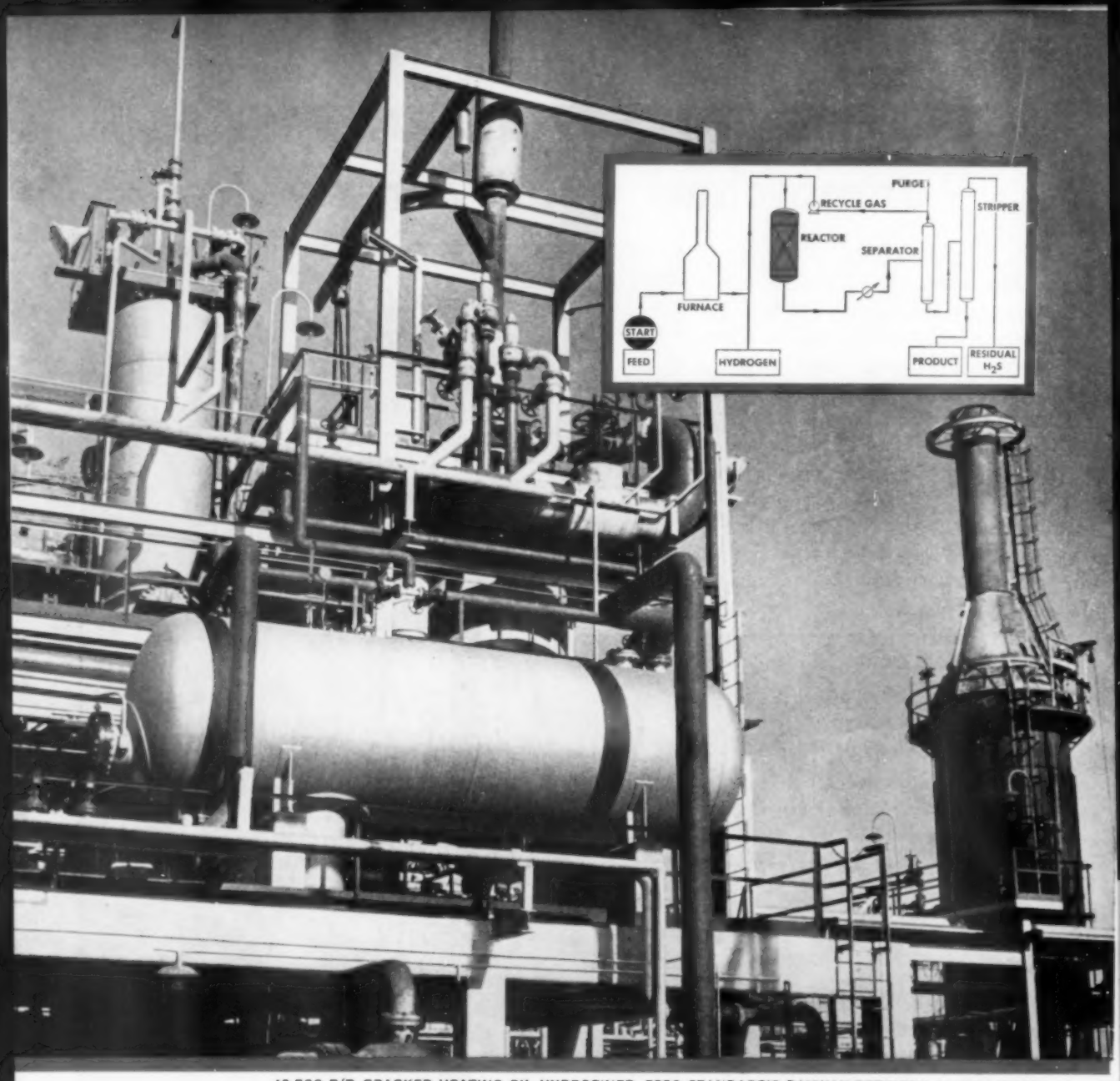
FIRST
with the FINEST
in SPUDDERS

60-L * 28-L
36-L * 48-L





19,500 B/D CRACKED HEATING OIL HYDROFINER, ESSO STANDARD'S BAYWAY REFINERY, LINDEN, N. J.

HYDROFINING CAN GIVE YOU TOP PERFORMANCE AT LOWEST INVESTMENT

Esso Research and Engineering offers you *Hydrofining*, a process now being applied to a greater variety of feed than any other hydrogen-treating process. *Hydrofining* uses by-product hydrogen to remove sulfur and other impurities *without yield loss*.

The process improves product stability, odor, color and other quality characteristics without the disadvantages of chemical or clay treating methods. *Hydrofining* is another achievement of the Esso Research program — 39 years of new process developments made available to refiners around the world.

Hydrofining experience has been gained from commercial units processing a wide variety of feed stocks such as naphthas, distillate fuels, lubes and waxes. This experience plus years of hydrogenation research gives us a unique opportunity to recommend the best design for your plant.

Twenty-three *Hydrofining* installations are on stream; nineteen more are in the construction or planning stage. Licensees enjoy benefits of continuing *Hydrofining* research. *Hydrofining* can play an important part in helping you process previously unattractive stocks into higher quality products. We would welcome your inquiry.

ESSO RESEARCH AND ENGINEERING COMPANY

P.O. Box 243, Elizabeth B, N. J.

Your key to progress... an Esso Research process

Are customer-inspectors necessary – in heat exchanger fabrication?

APEX PETRO-CHEM CORP.
INSPECTOR'S REPORT

TO: Chief Inspector
FROM: Southwest Regional Inspector

I have just witnessed the final hydro tests on Items E-301, E-302, E-304 and E-305, and have approved them for immediate shipment. Western maintained its usual high quality.

Delivery is being made, incidentally, one week ahead of schedule.

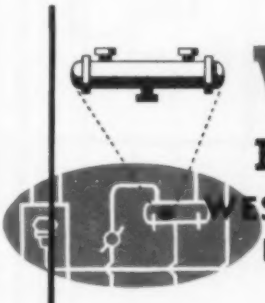
Question: Since heat exchangers fabricated in high standard shops are carefully inspected in accordance with A.S.M.E. Boiler and Pressure Vessel Code, as well as by the manufacturer himself, is it necessary for the customer to spend his own time and money in duplicating this work?

Answer: No, it is not necessary. However, we recognize that all first-line engineering and operating companies are going to make inspections as a matter of policy, THEREFORE . . .

. . . in the case of WESTERN, customer-inspectors are *welcome,* because it is from their reports and discussions that Western has acquired a reputation for the production of high quality heat transfer equipment throughout the petroleum and chemical industries.

Customer-inspectors, in other words, are Western's best salesmen.

Western's "open-door" policy to *all* customer-inspectors is worth investigating.



WESTERN
HEAT EXCHANGERS
WESTERN SUPPLY COMPANY
P.O. Box 1888 – Tulsa, Oklahoma

No embrittlement! Lowest cost! ASME Code approved!

In the subzero operating range . . . Specify Alcoa Aluminum equipment and piping

The flow chart details a tonnage oxygen plant now in actual operation where process temperatures average below minus 300° F. Notice that virtually all of the equipment and process piping are ALCOA® Aluminum. There's a good reason: aluminum is the lowest cost metal able to perform satisfactorily at low temperatures.

At subzero temperatures, ASME code approved aluminum alloys suitable for welded construction display improved yield and tensile strengths with no reduction in ductility or resistance to shock loading (see graphs). There is no embrittlement!

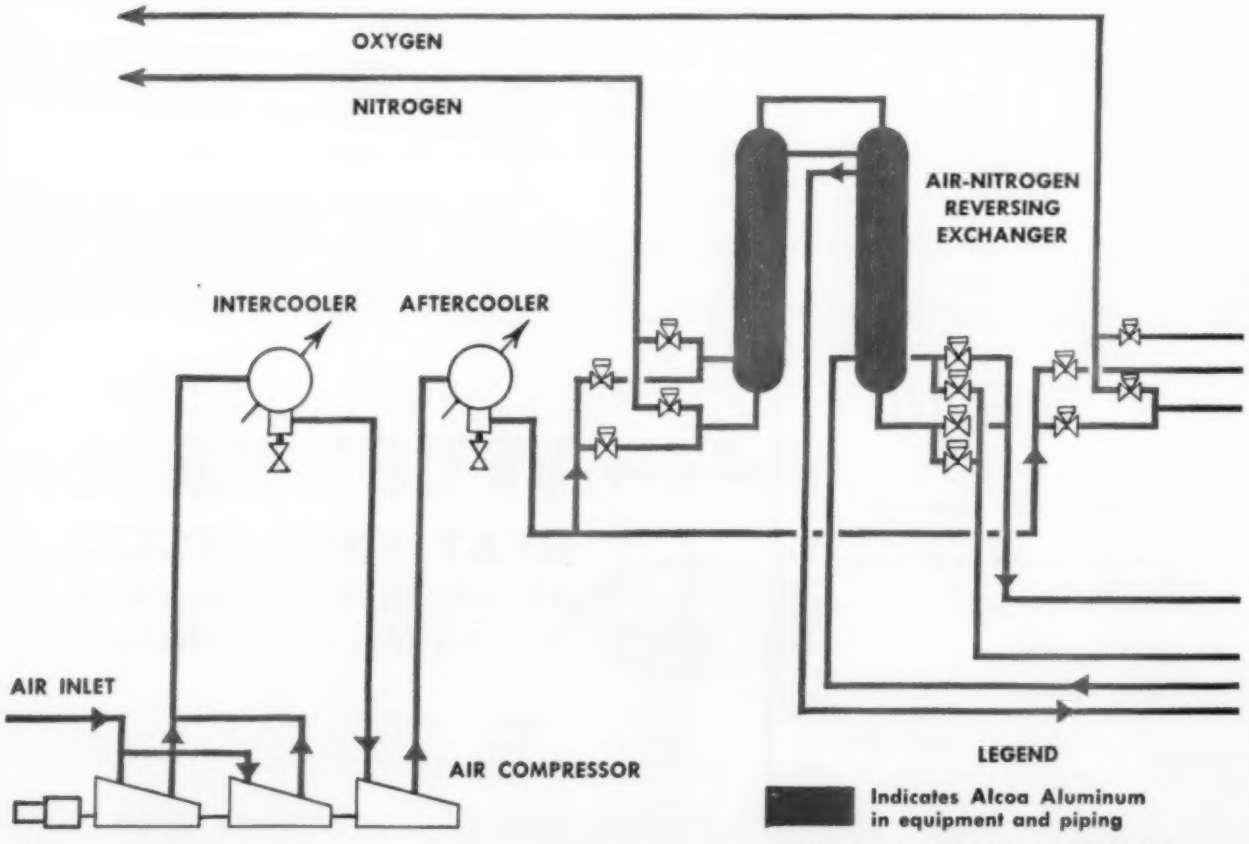
And in these operating temperature ranges, aluminum offers other valuable benefits . . . light weight . . . excellent resistance to corrosion . . . great strength in alloys . . . high thermal conductivity . . . nonmagnetic, nonsparking characteristics . . . nontoxicity . . . and excellent reflectivity. It is highly workable and lends itself readily to a variety of welding or brazing techniques for easy fabrication.

When *you* are looking for a low cost answer to the many problems of satisfactory equipment and piping performance in low temperature operations, *it will pay you to specify Alcoa Aluminum.* ALCOA engineers have worked with aluminum in the process industries for over 30 years. Use their accumulated knowledge to help you find satisfactory answers to *your* process equipment problems. Consult the nearby ALCOA sales office listed in the Yellow Pages of your telephone directory . . . or outline your equipment requirements in a letter to ALUMINUM COMPANY OF AMERICA, 904-A Alcoa Building, Pittsburgh 19, Pa.

"ALCOA THEATRE"
Exciting Adventure
ALTERNATE MONDAY EVENINGS

ALCOA ALUMINUM

THIS FREE BOOK is filled with detailed data on the behavior of aluminum in the process industries . . . the result of more than 30 years of Alcoa engineering experience with aluminum in a variety of applications in nearly every temperature range. Use it as your guide to trouble-free, corrosion-free process equipment and piping. Write today for *Process Industries Applications of Alcoa Aluminum.*



LOW TEMPERATURE PROPERTIES OF ALCOA ALLOY 5154-0

Alcoa Aluminum actually increases in strength with no loss in ductility as temperatures drop to minus 320°F and below. Alloy 5154-0, for example, improves 50% in tensile strength, over 13% in yield strength and approximately 60% in elongation.

Photograph shows installation of Alcoa Aluminum equipment and piping in oxygen plant detailed in flow diagram. Harp-type heat exchangers (left) are dip-brazed assemblies with thousands of fins for best heat transfer.

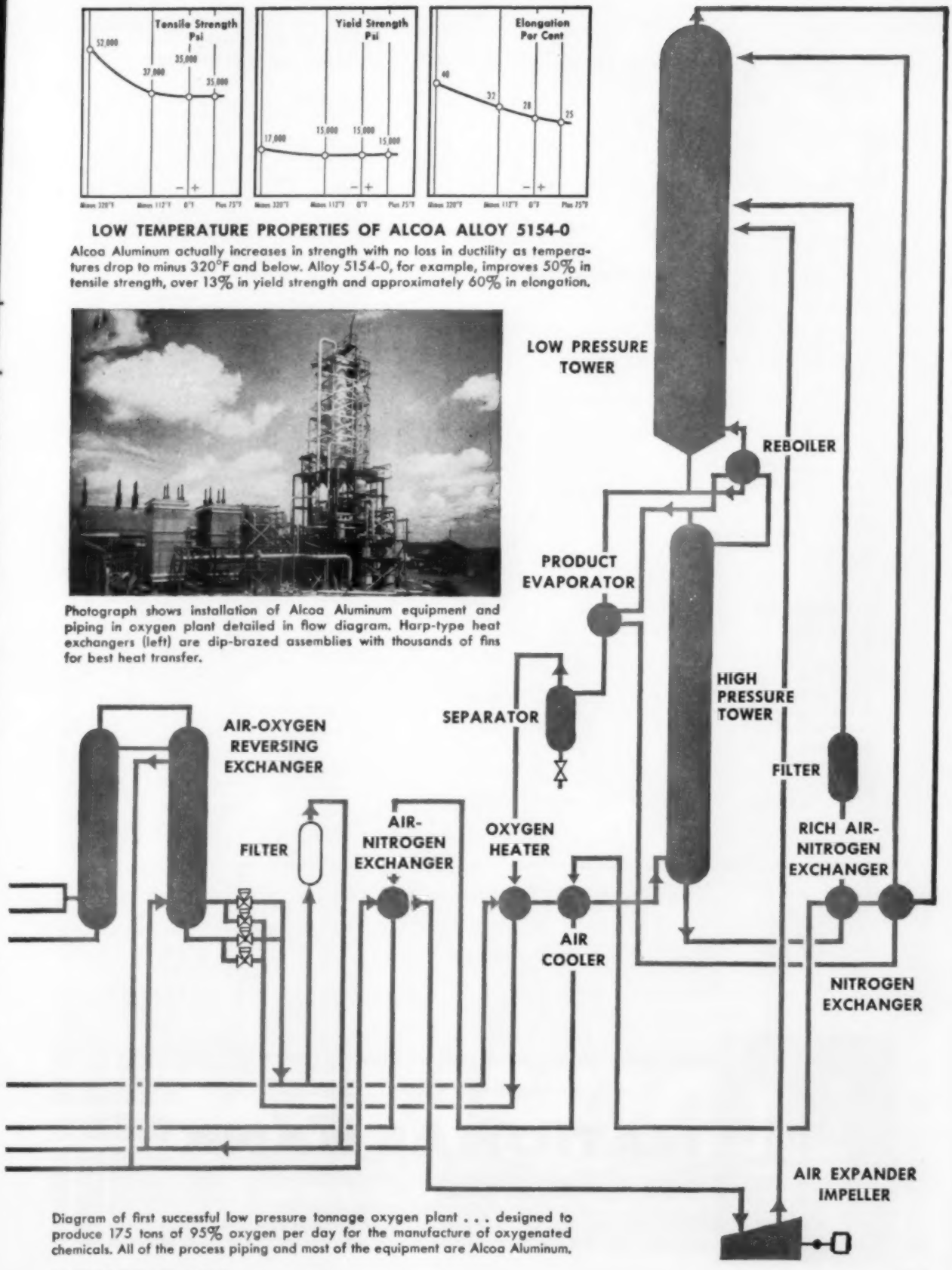


Diagram of first successful low pressure tonnage oxygen plant . . . designed to produce 175 tons of 95% oxygen per day for the manufacture of oxygenated chemicals. All of the process piping and most of the equipment are Alcoa Aluminum.

STATEMENT OF CONDITION

At the Close of Business December 31, 1957

ASSETS

Cash on Hand and Due from Banks		$296,794,262.89
United States Government Obligations	$82,597,115.85	
Public Housing Authority Obligations (Fully Guaranteed)	4,440,747.06	
State, County, and Municipal Bonds	16,658,593.57	103,696,456.48
Other Bonds		6,144,308.51
Stock in Federal Reserve Bank		1,533,000.00
Loans and Discounts		378,433,617.73
Commodity Loans		8,359,897.95
Income Accrued		2,466,162.65
Letters of Credit and Acceptances		13,984,471.59
Banking House and Equipment		9,469,968.16
Other Assets		121,543.87
		$821,003,689.83

LIABILITIES

Capital Stock	$ 23,100,000.00	
Surplus Fund	28,000,000.00	
Undivided Profits	5,002,438.96	$ 56,102,438.96
Reserved for Contingencies		7,973,350.28
Reserved for Taxes, Etc.		5,987,908.24
Deferred Income		2,274,183.70
Letters of Credit and Acceptances		13,984,471.59
DEPOSITS:		
Individual	$484,626,192.16	
Banks	237,951,720.49	
U. S. Government	12,103,424.41	734,681,337.06
		$821,003,689.83

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Ben Wooten
PRESIDENT
First National Bank in Dallas

GIVE US AN OPPORTUNITY TO SAY · YES ·

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NATIONAL BANK in Dallas

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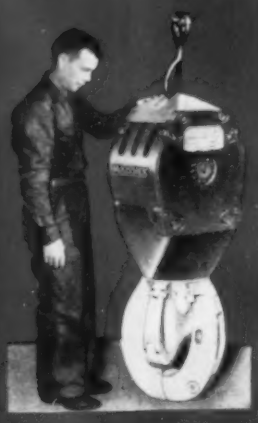


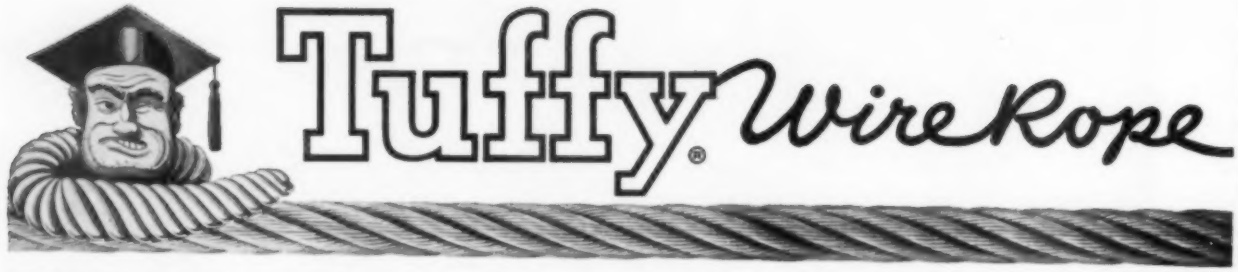
Embodying These Superior McKissick Features

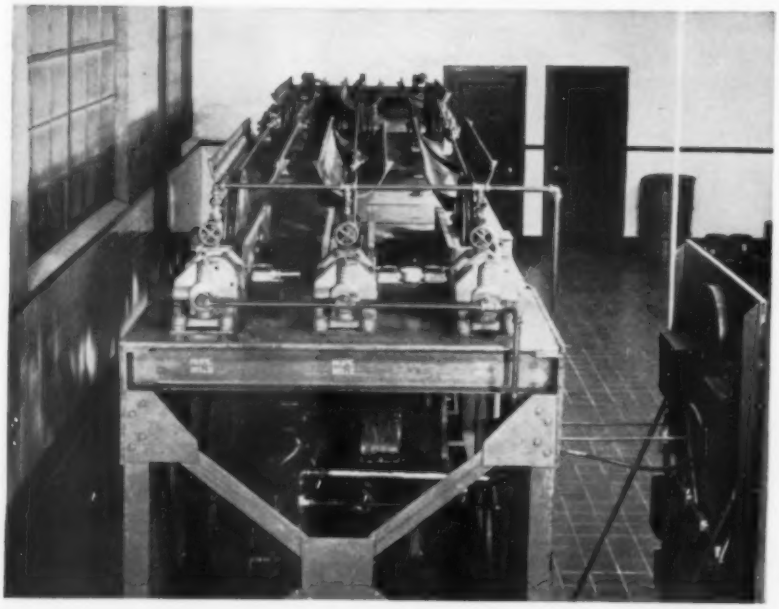
- Extra weight and balance for "non-wobbling" falls.
- Johns-Manville "Klipper" grease seals.
- Easy opening guards, no bolts to take out and lose.
- Extra large bearing diameters.
- Divider plates between each sheave, eliminates center pin deflection.

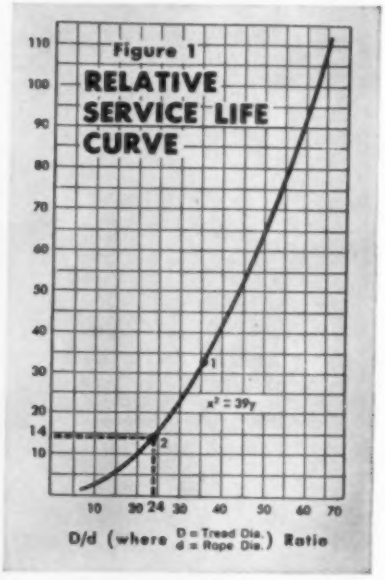
McKISSICK

McKISSICK PRODUCTS CORPORATION

Box 2496 Tulsa, Oklahoma







How Union Wire Rope Fatigue Tester Scientifically Predetermines Rope Life

How much service life can you expect from a given wire rope construction? Until recently there was very little factual data to answer that question. Predicting how long a certain wire rope would last under a given set of operating conditions was largely a matter of guesswork, trial-and-error and generally inexact calculations.

Knowing that bending stresses are a major factor in wire rope life, Union Wire Rope engineers designed the Accelerated Fatigue Tester, shown above, to pin down the effects of bending. Now, from a long series of bending tests, scientific data has been accumulated and organized to take the place of former rule-of-thumb methods.

"Preview" of Service Life You Can Expect

The data established by this laboratory research is based on the effects of various sheave diameters on bending stresses of various constructions of wire rope.

From test data, bending life curves have been plotted by Union Wire Rope Engineers for each of the more widely used rope constructions. Analysis of each of these curves showed them to follow a pattern expressed by the curve shown in Fig. 1 at right, above.

Note on Fig. 1 the curve shows that as the ratio of tread diameter to rope diameter increases (see D/d figures at bottom of chart) the longer the relative service life as expressed by the figures at the left of the chart.

However, there are few pieces of equipment on which sheave and drum sizes can be large enough to afford D/d ratios above 50. From test data the general-purpose range of D/d ratios was determined. Those recommended are set up in Table 3.

Spotted on the curve, for example, is the D/d ratio of 24 at point 2 and D/d ratio of 36 at point 1—these being the range for general purposes taken from Table 3 for the 6x25 filler rope. Moving from these points to the left on the chart, the relative service life of this rope ranges from 14 to 34 units of any service measure used, such as yards, tons, days, etc. 58-2

Table 2

BENDING-LIFE FACTORS

When Using Curve of 6x25 FW

CONSTRUCTION	FACTOR
6x7	0.57
18x7	0.67
6x17 Seale	0.73
6x19 Seale	0.80
6x21 Filler Wire	0.92
6x25 Filler Wire	1.00
6x31	1.00
8x19 Seale	1.14
6x37	1.33
8x19 Warrington	1.33
Tiller Rope	2.00

Table 3

SHEAVE DIAMETER FACTORS

ROPE CONSTRUCTION	GENERAL PURPOSE RANGE D/d Ratios	Where D = Tread Dia. d = Rope Dia.
6x7	63	42
18x7	54	36
6x17 Seale	49	33
6x19 Seale	45	30
6x21 Filler Wire	39	26
6x25 Filler Wire	36	24
6x31	33	22
8x19 Seale	31	21
6x37	27	18
8x19 Warrington	27	18
Tiller Rope	18	12

Tips

Now to determine the relative service life of say a 6x37. Its bending life factor (see Table 2) is 1.33 as compared to 1.00 for the 6x25 filler wire. Multiply the service life readings of 14 and 25 for the 6x25 filler wire by 1.33, and we find the service life range of the 6x37 falls at 18 and 27 units of service. Relative service life of other ropes are determined in the same way by using the bending factor indicated for each as the multiplier.

Of course bending is not the only wear factor in wire rope operation. Hence the general rule—that more flexible ropes should be used as bending stress increases with decrease in diameter of sheave or drum—has to be modified in field use. Other principal operating conditions—in addition to bending stresses—that affect wire rope service life are loading conditions, portability, corrosion, abrasion, rope speeds, materials handled, and equipment design. You can get further information on all wear factors from your Union Wire Rope distributor or the Union Wire Rope Corporation engineering staff.

Ordering is ABC-Simple!

No complicated codes or long list of specifications. Just say "Tuffy", give type (Scraper Rope, Dozer Rope, etc.), length wanted and size. Just that easy!

Good Man to Know: Your Nearby Union Wire Rope Distributor

Whether your wire rope need is a scheduled replacement or a red-hot emergency, your Union Wire Rope distributor is ready with "right-now" service. He keeps varied stocks of Union standard constructions and the Tuffy Special Purpose Ropes. And he's backed by quick service from his nearby Union Wire Rope depot.

If it isn't rope you need, but advice on a wire rope problem, he's just as ready to help. If you don't know your Union Wire Rope distributor already, look under "Wire Ropes" or "Slings" in your telephone directory yellow pages.

Excessive strength can make a rope "muscle-bound"... Wire Rope must be

BALANCED

Buying wire rope on the basis of strength alone leaves other important properties out of consideration. Wire rope, like athletes, can be "muscle-bound" with too much strength.

Strength is not always the answer to the question of the proper rope to use. Strength does not increase flexibility, resistance to crushing, abrasive or fatigue-resistant qualities. Strength does not compensate for the core crushing which accompanies excessive loading.

The Tuffy ropes are engineered for each end-use of the different types of rope. The combination of strength, toughness and flexibility is different for each application. The way to be sure your rope is BALANCED for its job is to use Union Wire Rope. Get in touch with your Union distributor.

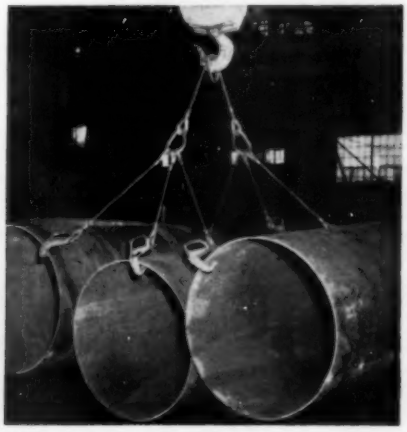
Tuffy Special Purpose Ropes: tailored and BALANCED for special uses

Tuffy BALANCED Rotary Lines

STANDARD Rotary Line. For top performance in drilling use with standard rigs in any formation. Also a star performer in deep drilling beyond 6000 ft. with jackknife rigs.

JACKKNIFE Rotary Line. Combines proper balance of extra strength and extra flexibility. Spools easily on small sheaves and drums of jackknife rigs drilling to 6000 ft.

Tuffy BALANCED Slings and Hoist Lines



This team has made a name for cutting hoisting and downtime costs in all types of materials handling: Tuffy Hoist Line, the longer running rope, and Tuffy Slings, made of an extra flexible machine-braided fabric that smooths out uninjured after knotting or kinking.

Easy to order! Just say **Tuffy**... *give length and size! No complex specifications.*

union Wire Rope **corp.**

2102 Manchester Avenue, Kansas City 26, Mo.

Specialists in high carbon wire, wire rope, braided wire fabric, stress relieved wire and strand

A. O. Smith developed the rotary positive displacement metering technique. Years of service for "top drawer" companies have proved its exceptional accuracy.

A. O. Smith meters for bulk plants, pipelines, refineries and industrial service

Illustrated, S-35 Meter, rated capacity is 350 G.P.M., working pressure 150 p.s.i.

Perfect Auditors

A. O. Smith meters — which print a permanent, tamperproof record of each transaction — are assuming the role of business machines in custody transfer and similar types of service. Why not contact your representative or write direct and let us tell you how this new development more than pays for itself in terms of conserving manpower . . . eliminating disputes . . . simplifying accounting and bookkeeping.

Through research . . . a better way

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Why a Steam Trap Has to Handle "Air"

Low temperatures and corrosion of equipment are often evidence of inadequate trap air venting capacity

Air, with its load of oxygen and carbon dioxide, has an unwholesome habit of interfering with the efficiency of steam heated units. If steam were always free of these undesirable companions, things would be a lot simpler for men-who-operate-plants. Because it isn't, three unhappy situations frequently occur:

1. ***Operating temperatures are subnormal.*** This is a two-part problem. First, an air-steam mixture has a lower temperature than pure steam at the same pressure—see Table A. Secondly, air can "plate out" on heat transfer surfaces as shown in Figure 1. Under some conditions, such an air film will knock down heat transfer efficiency by as much as 50%.

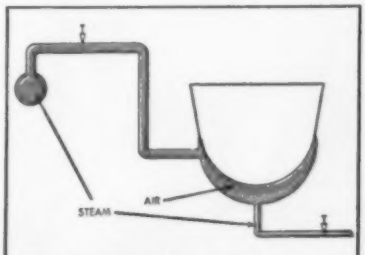


Fig. 1. *How air can "plate out" on heat transfer surfaces. This "insulation" drastically reduces heat transfer efficiency. Armstrong trap operation creates turbulence in the equipment that prevents this.*

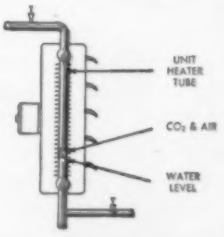


Fig. 2. *Corrosion occurs when units are not kept continuously free of both condensate and air. Armstrong traps discharge both, at steam temperature, as fast as they accumulate.*

2. ***Corrosion rears its ugly head.*** Oxygen and carbon dioxide are real trouble-makers. CO_2 gas goes into solution in condensate, forms carbonic acid and chews away at vulnerable metal sections. O_2 aggravates the situation. See Figure 2.

TABLE A—How air reduces steam temperature.

Gauge Pressure	Temp. of Steam with No Air Present	Temp. of Steam Mixed With Various Amounts of Air (% Air by Volume)	
		10%	30%
10.3	240.1	234.3	220.9
25.3	267.3	261.0	246.4
50.3	298.0	291.0	275.1
75.3	320.3	312.9	295.9
100.3	338.1	330.3	312.4

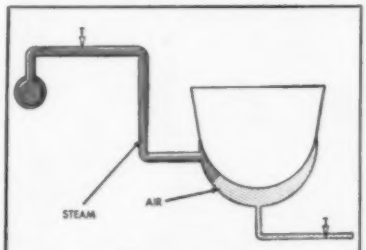


Fig. 3. *When steam is turned on, it takes a trap with extra air venting capacity to provide fast heat-up.*

3. ***Heat-up is slow as a snail.*** Air has a picnic in units that are shut off periodically. Figure 3 pictures the problem. Lines and equipment literally fill up with air. When the steam is turned on it can get in only as fast as the air gets out.

Enter Steam Traps

Curing these steam system ailments involves an operation sometimes called a "trap transplant." It consists of removing traps that don't get the air out and replacing them with traps that do.

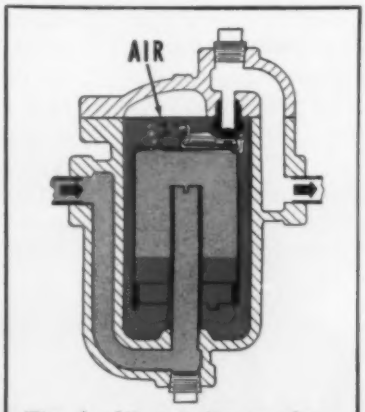
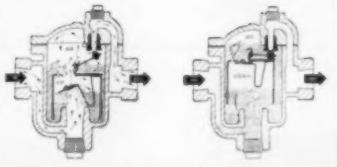


Fig. 4. *Air entering an Armstrong trap passes through the bucket vent and accumulates in the top of trap. When trap opens, air is discharged along with condensate.*

Figure 4 shows how an Armstrong inverted bucket trap continuously vents air. What the picture doesn't show is a built-in plus-value of this trap's design. An Armstrong trap opens suddenly, creating a momentary pressure drop and turbulence in the unit being drained. This breaks up air films and "pumps" air down to the trap so it can be vented.

The vents in standard Armstrong trap buckets will pass all the air normally encountered. In special cases, such as paper machine dryers, the vents are correctly sized larger at the factory to meet the requirement.



Thermostatic vent open. *Thermostatic vent closed.*

Fig. 5. *Open float with thermostatic vent for off-and-on units. When trap is cold, vent is open, permitting air to blow through when steam is turned on. When steam reaches trap, heat closes thermostatic vent. Then, regular bucket vent handles all air coming in with steam.*

Open Float with Thermostatic Vent

Super air-venting capacity is a must for fast heat-up of low pressure unit heaters, heating coils, steam headers and other units that are on-and-off. Figure 5 shows how the Armstrong open-float-with-thermostatic-vent trap takes care of this.

* * *

The 44-page Armstrong steam trap book covers other features of the Armstrong trap as well as its excellent air handling characteristics. This catalog also discusses trap selection, installation and maintenance. Your local Armstrong Representative or Distributor will be glad to give you a copy. Call him, or write Armstrong Machine Works, 8681 Maple Street, Three Rivers, Michigan.

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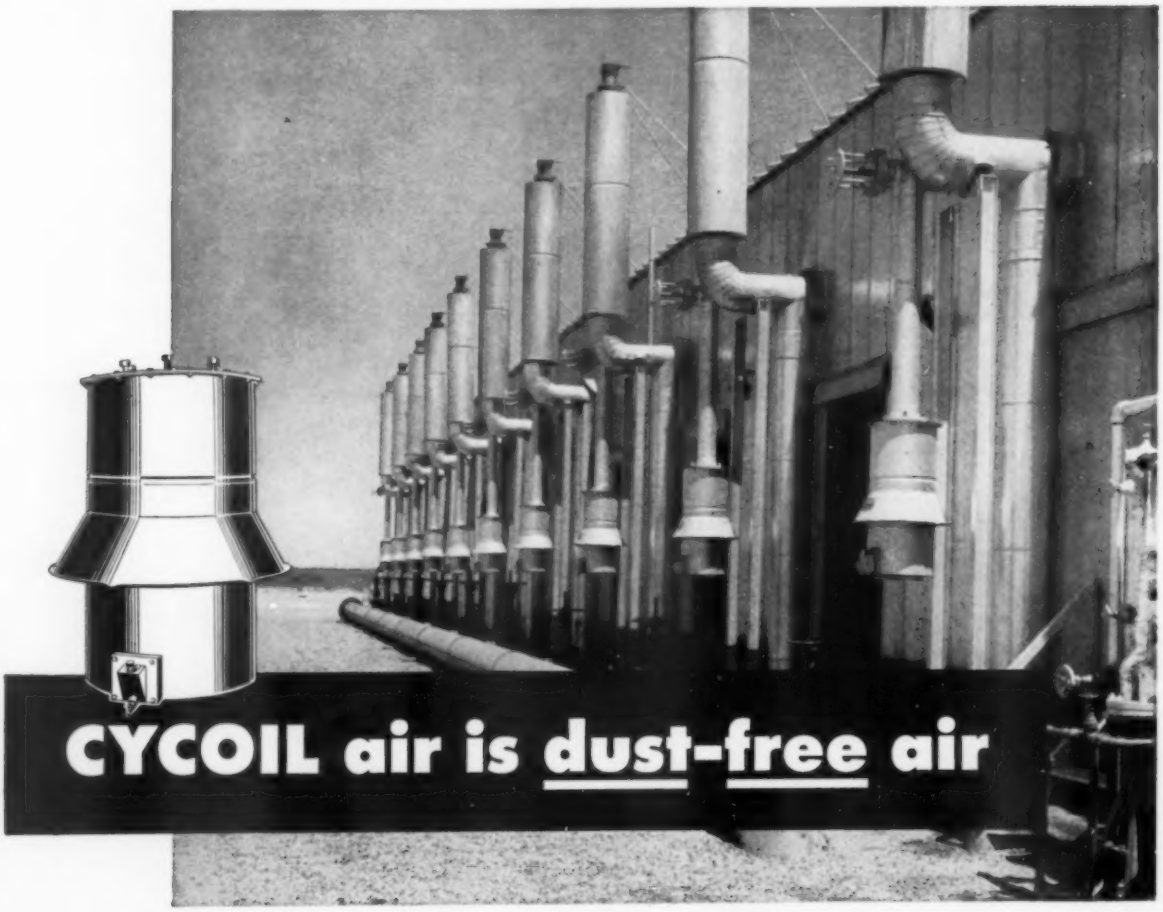
Ten AAF Cycoils deliver *clean* air to the 660 hp. engines driving pumps at the Ward-Estes Water Flood Project.



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AAF Cycoils protect engines—require minimum maintenance

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AAF Cycoil oil bath air cleaners require an absolute minimum of maintenance. It is not necessary to tear them down for cleaning. Due to self-cleaning action of the filter pads, the only maintenance needed is the periodic replacement of oil. Records show that Cycoils have been on the job in some applications for as long as 20-years without being dismantled for maintenance.

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For, you see, the new GMC Money-Makers are *extra-stamina-engineered*. That means they're powered to haul top loads of equipment anywhere—then to give you ample take-off power for drilling or workover.

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America's Ablest Trucks

available in models from 1/2 to 45 tons

They Say—

Automation panel got results

Dear Sir:

The December 9, 1957, issue of The Oil and Gas Journal contains on pages 72-74 the very informative article entitled "Automation: It's Still Down the Road."

Our H. S. Stover was a speaker at the Continental Oil Co. discussion panel described in the above article . . .

It might be of interest to you to learn that upon the conclusion of the meeting Continental Oil Co. placed an order with Beckman Instruments, Inc., for a 100-channel Model 112 Computational Data Processing System.

W. F. Kamsler
Product Line Sales Supervisor
Systems Division
Beckman Instruments, Inc.

Secretary Weeks looks at '58

"Fu'ly alert to recent and continuing slowdown, I expect the level of business to be high in 1958 with output larger than in most years. Also, I anticipate stiff competition which, of course, is the priceless ingredient of our system.

"1957 was spurt then sag; 1958 looks like mild dip then climb—with government policies strengthening public confidence and federal, state, and local government programs adding new push to production and employment."

Sinclair Weeks, Secretary of Commerce, in a year-end economic review.

We goofed on Paria owners

Dear Sir:

In the December 30 issue of The Oil and Gas Journal, page 120, you have a story "Trinidad Eyes Oil for Money." In the last paragraph of that article you state . . . "Paria Operations, Inc., is drilling its first well on the Venezuelan side of the gulf. The company is the operator for a four-company group, Continental Oil Co., Texaco, Cities Service Oil Co., and Richfield Oil Corp."

I call this to your attention because the Ohio Oil Co.'s name is not mentioned and for your information, owns a 25 per cent interest in the venture.

This also applies to the World-Wide Oil Report on page 163, in regard to new concessions in Venezuela.

M. S. Hauser
Manager
Public Relations Department
Ohio Oil Co.
Findlay, Ohio

(Editor's note: Reader Hauser is correct. Ownership of Paria Operations, Inc., is: Continental Oil Co. of Venezuela, 25 per cent; Ohio Oil Co. of Venezuela, 25 per cent; Texas Petroleum Co., 25 per cent; Cities Service Oil Co., 16⅔ per cent; and Richfield Oil Corp., 8⅓ per cent.)

Whose cracker has record?

Dear Sir:

The December 23, 1957, issue of The Oil and Gas Journal carries an item on page 131 claiming for Standard Oil Co. (Ind.) a world record of 905 days for "cat cracker" operation.

You may be interested to know that the Cities Service refinery at Lake Charles, La., operated one of its three catalytic crackers continuously for 1,065 days, from April 9, 1954, to March 10, 1957. This was what is known as the "C" unit. In

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New high grades of tubing and casing have been designed to withstand extremes of pressures and temperatures. Because they are being subjected to more severe service, they should receive specialized inspection to detect any latent or incipient transverse cracks in the end areas. Such transverse or radial flaws can result in costly and time-consuming breakdowns if not detected prior to use.

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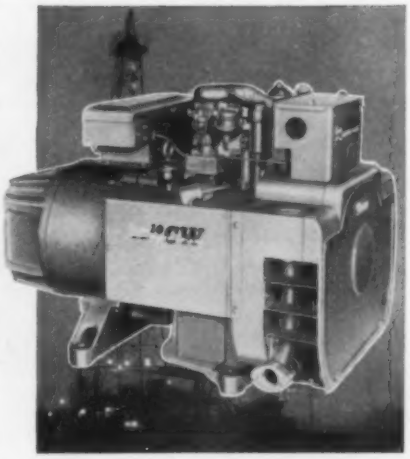

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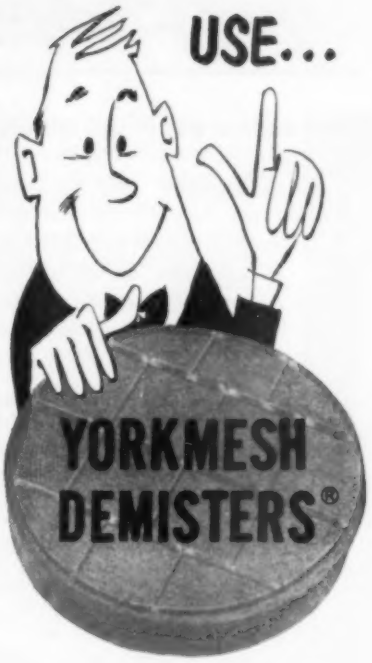

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January 1952, the "B" unit of the same refinery ran continuously for about 1,058 days.

The item about the so-called world's record cracker of Indiana Standard states that the cracker charged 7,622,-191 bbl. of oil during its run. Our "C" unit processed 46,683,438 bbl. of feed stock during its run of 1,065 days.

Our own runs, which we think still hold the world's record, were widely publicized at the time. This is not to suggest saying anything further about them now, but you might like to refer this letter to whatever member of your staff handles such items for his information.

Paul Hodges
Assistant to the Chairman
Cities Service Co.
New York

CALENDAR

JANUARY

29-31 Ninth annual Institute on the Law of Oil and Gas Taxation, sponsored by Southwestern Legal Center, Dallas.

31 Natural Gasoline Association of America, regional meeting, Skirvin Hotel, Oklahoma City.

FEBRUARY

3-4 Instrument Society of America, chemical and petroleum industry symposium on progress and trends in chemical and petroleum instrumentation, Hotel Du Pont, Wilmington, Del.

5-6 Western Petroleum Refiners Association, Gulf Coast regional technical-industrial relations meeting, Ben Milam Hotel, Houston.

12-14 National Association of Corrosion Engineers, Tulsa section, ninth annual corrosion short course for pipeliners, Mayo Hotel, Tulsa.

13-15 National Society of Professional Engineers, spring meeting, Michigan State University, East Lansing, Mich.

16-20 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual meeting, Hotel Statler, New York.

20-22 Pipe Line Contractors' Association of Canada, annual convention, Empress Hotel, Victoria, B. C.

24-28 American Society of Civil Engineers, annual convention, Sherman Hotel, Chicago.

26-28 American Petroleum Institute, Division of Production, southern district meeting, Shamrock-Hilton Hotel, Houston.

28 Natural Gasoline Association of America, Permian basin regional meeting, Lincoln Hotel, Odessa, Tex.

MARCH

3-4 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, fourth annual joint meeting of Rocky Mountain petroleum sections, Cosmopolitan Hotel, Denver.

5-6 Gas Conditioning conference, sponsored by the University of Oklahoma, Oklahoma Memorial Union Building, Norman, Okla.

7 Ohio Oil and Gas Association, winter meeting, Deshler Hilton Hotel, Columbus, Ohio.

7-8 American Association of Petroleum Geologists, Pacific Coast section, annual meeting, Ambassador Hotel, Los Angeles.

10-13 American Association of Petroleum Geologists and Society of Economic Paleontologists and Mineralogists, forty-third annual meeting, Biltmore Hotel, Los Angeles.

12-14 American Petroleum Institute, Division of Production, southwestern district meeting, Hotel Texas, Fort Worth.

17-21 National Association of Corrosion Engineers, annual conference, civic auditorium, San Francisco.

17-21 International Atomic Exposition, Inc., 1958 Nuclear Congress, Chicago Amphitheatre, Chicago.

20-21 New England Gas Association, annual meeting Hotel Statler, Boston.

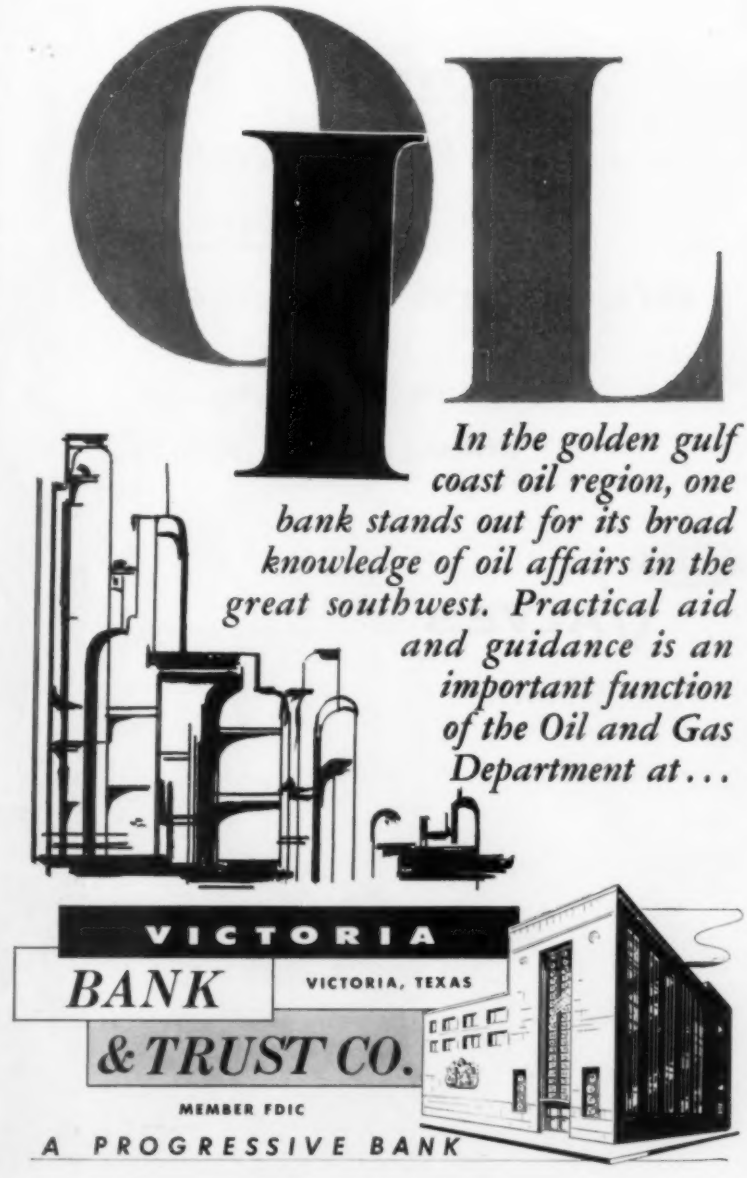
20-21 Society of Petroleum Engineers of American Institute of Mining, Metallurgical, and Petroleum Engineers, regional conference on production and reservoir engineering, Mayo Hotel, Tulsa.

24-26 Midwest Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

24-26 Western Petroleum Refiners Association, annual meeting, Hilton Hotel, San Antonio, Tex.

27-29 American Institute of Mining, Metallurgical, and Petroleum Engineers, Pacific Southwest conference, St. Francis Hotel, San Francisco.

29 North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex.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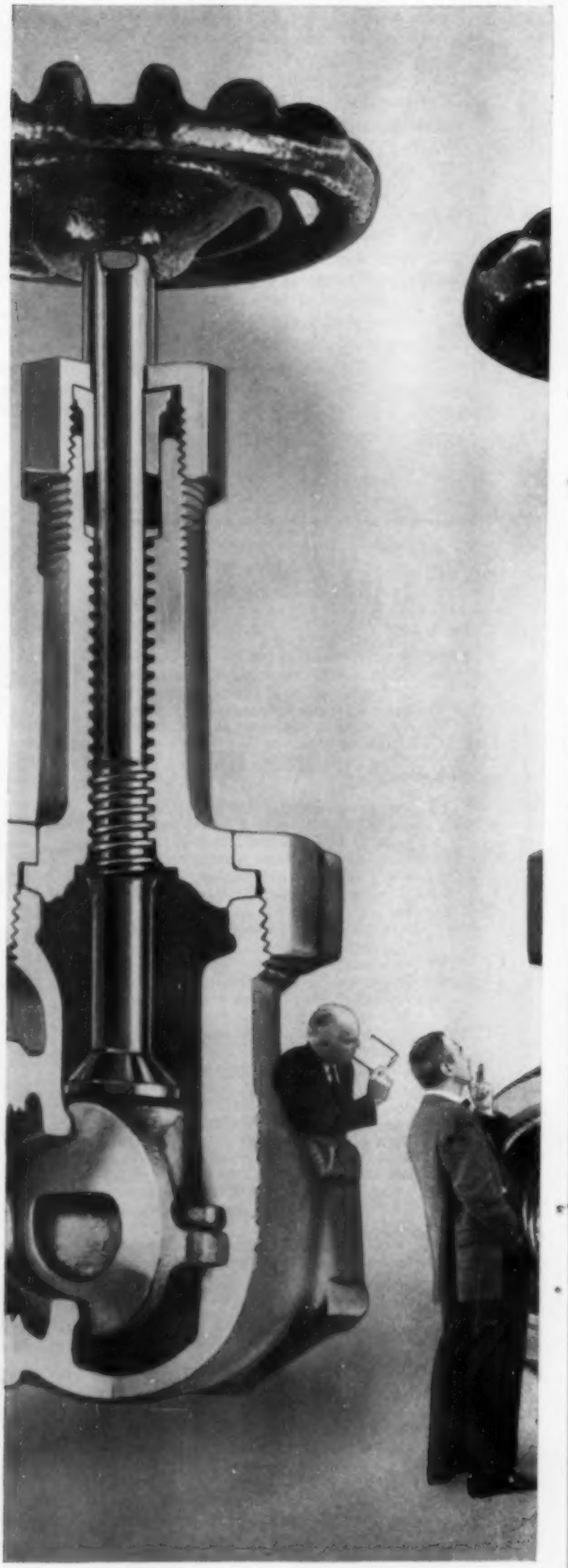

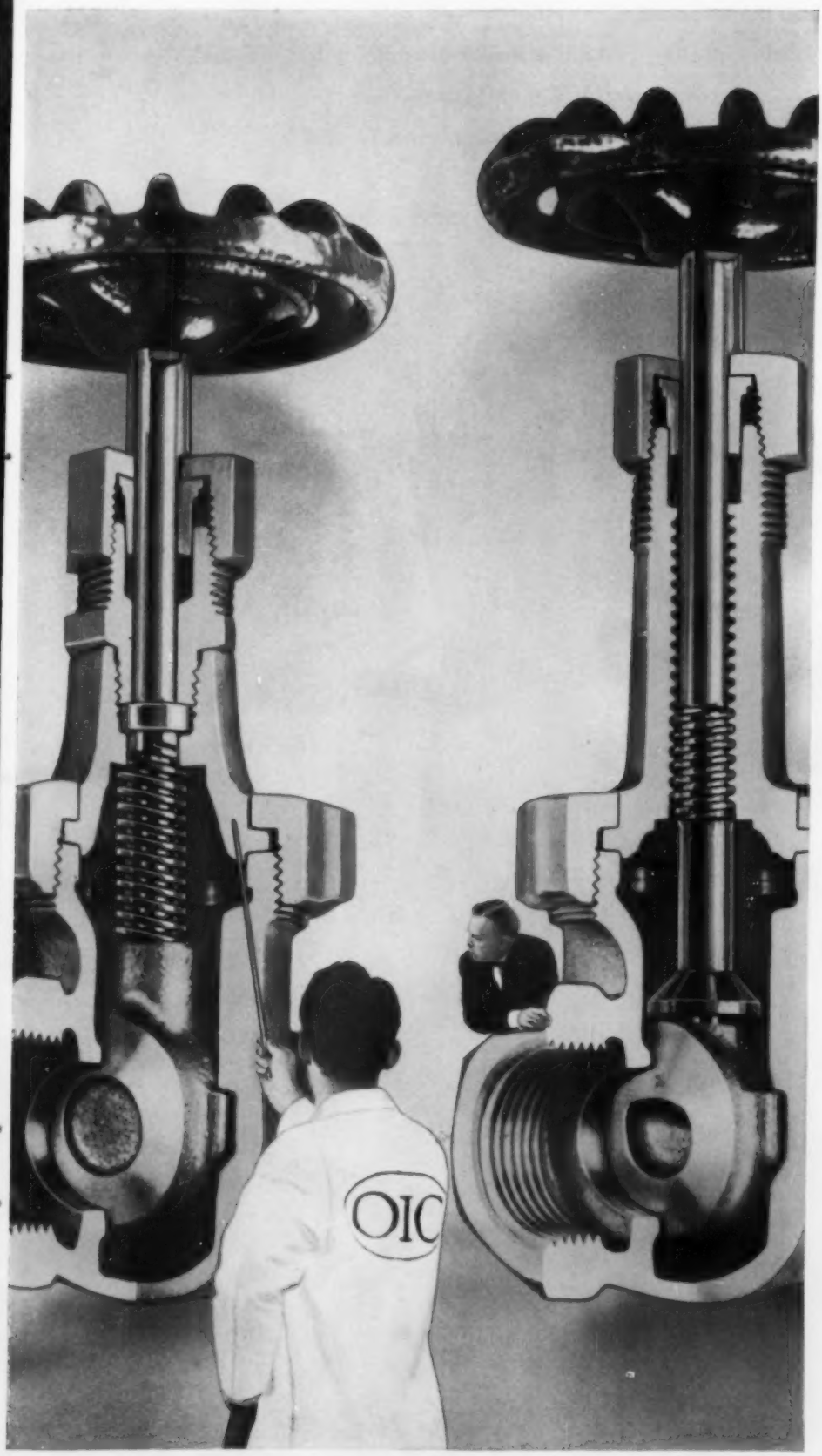

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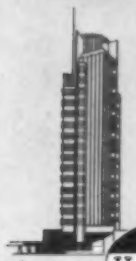

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TULSA, OKLAHOMA

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JOURNALLY SPEAKING

Figure Heads and Crystal Gazers

"HOW IN THE WORLD do you guys manage to get out so much stuff?" is a question we get tossed at us frequently.

The answer so far as this review and forecast issue is concerned is the 18 men pictured above. They are less than half our staff of full-time editors, each an expert in his field. For weeks this issue has been their major, if not almost their exclusive, concern. They get big assists from other staff members—but they also did their usual stints for the regular weekly issues.

These are the mugs of the pencil-pushers who put this issue together. We can't detail individual credits, but the top row was primarily in charge of the planning; the middle row was chiefly concerned with drilling, production, and reserve figures; and the bottom row worked mainly on special assignments.

We deliberately departed from protocol by not leading off with Editor-in-Chief Barnes because we wanted to make it clear (as if you couldn't guess) that the Economics Editor and the Exploration Editor carry the bulk of the load on this issue.

The next two in line are our Presentation Editor and our Head Staff Artist. They worked with all the authors in making the material fit the allotted space and in presenting the charts and tables in ways to get the information across best. Neither of them did any research or writing, but this issue would have been one big mess without them.

No. 1 Boy on this who'e business was Economist Casper. He did much of the figure work himself, and organized and checked over everybody else's. We call this issue his baby—and it keeps him up nights more than any real baby. He's also Custodian of the Crystal Ball, and by ways known only to himself came up with all the forecasts in this issue.

Geologist Gardner wrestled with reserves, rode herd on his nationwide network of field reporting, and —oh, there's no space to tell what everybody did. It was a cooperative job—the usual Journal staff effort. Just thought you'd like a look at the guys who did most of this one.

—Henry D. Ralph.

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These figures call for patience and planning

NOW that the figures for 1957 have been tabulated and the forecasts for 1958 have been made, the industry has a blueprint for its course during the coming year: "Watch and wait in '58."

Oil is in a sort of doldrums, a temporary calm without much wind to puff its sails in any direction.

This is due partly to the culmination of events within the industry during the past couple of years, partly to the downswing of general economic conditions. At any rate, oil is in better shape than many other industries as we go into 1958.

FOR THE PETROLEUM INDUSTRY as a whole, 1958 promises to average out at pretty much the same levels as in 1956 and 1957, except for drilling. Demand, production, and refinery runs should be no lower than last year, and probably a little higher.

The drilling rate will drop lower, but there are signs that this year will see the bottom of the down trend. The 1958 decline will be much less than that of 1957. Wildcat drilling will be higher than last year. And the biggest operators seem to be down to about their minimum drilling schedules.

The brightest aspect of the 1958 forecasts is that they should not catch anyone unaware, and therefore the whole industry should be prepared to act on them intelligently. There is nothing startling or unexpected in the outlook. The trend has been foreshadowed for months.

By being warned now of what to expect in the coming months, operators can make the most of the condition. This may require some shifts in business thinking.

This is an interval of marking time—not sliding back but not moving ahead much. It is a time for holding the line temporarily while rechecking plans for future advances.

Oil must learn to live with excess capacity, just as many other industries have had to do. Before this year is over, there is every reason to believe, demand for petroleum products will resume its steady climb. But this can't be rushed.

MEANWHILE oil is in a precarious position as to its price structure. With capacity to supply so far ahead of the modest increase in demand, there is a constant danger of overflooding the market. And this could easily pull down both crude and products prices, already weakened by erosion.

Lowered over-all income for the same total volume would really be a setback for the industry and would prevent it from preparing for future expansion. But if, by avoiding needless surpluses, oil can maintain its income level, it should pull through 1958 in good shape.

So this year calls for caution, watchful waiting, and close attention to the realities of this period of moderate slack.

Lightweight construction—made possible by USS "T-1" Steel—cut shipping, handling and erection costs of these giant pressure vessels, located in Tokyo, Japan.

1,720 tons of steel saved by building gas pressure vessels with USS "T-1" Steel

COMPARED TO CARBON STEEL CONSTRUCTION, the use of USS "T-1" Steel saved 1,720 tons of steel in the two giant pressure vessels pictured here. Having a diameter of 110.5 ft. each, they are the largest vessels ever built for the storage of gas. USS "T-1" Steel enabled Chicago Bridge & Iron Company to use 0.73-inch-thick shell plates rather than mild steel plates 1.75 inches thick.

USS "T-1" Steel's high yield strength (90,000 psi minimum), plus previous experience in building vessels designed with high working stresses, permitted use of a maximum allowable working stress of 36,000 psi to which a 90% weld joint efficiency was applied. With the exception of the working stress values and the elimination of stress relieving, the vessels were built to the ASME Code for Unfired Pressure Vessels where applicable.

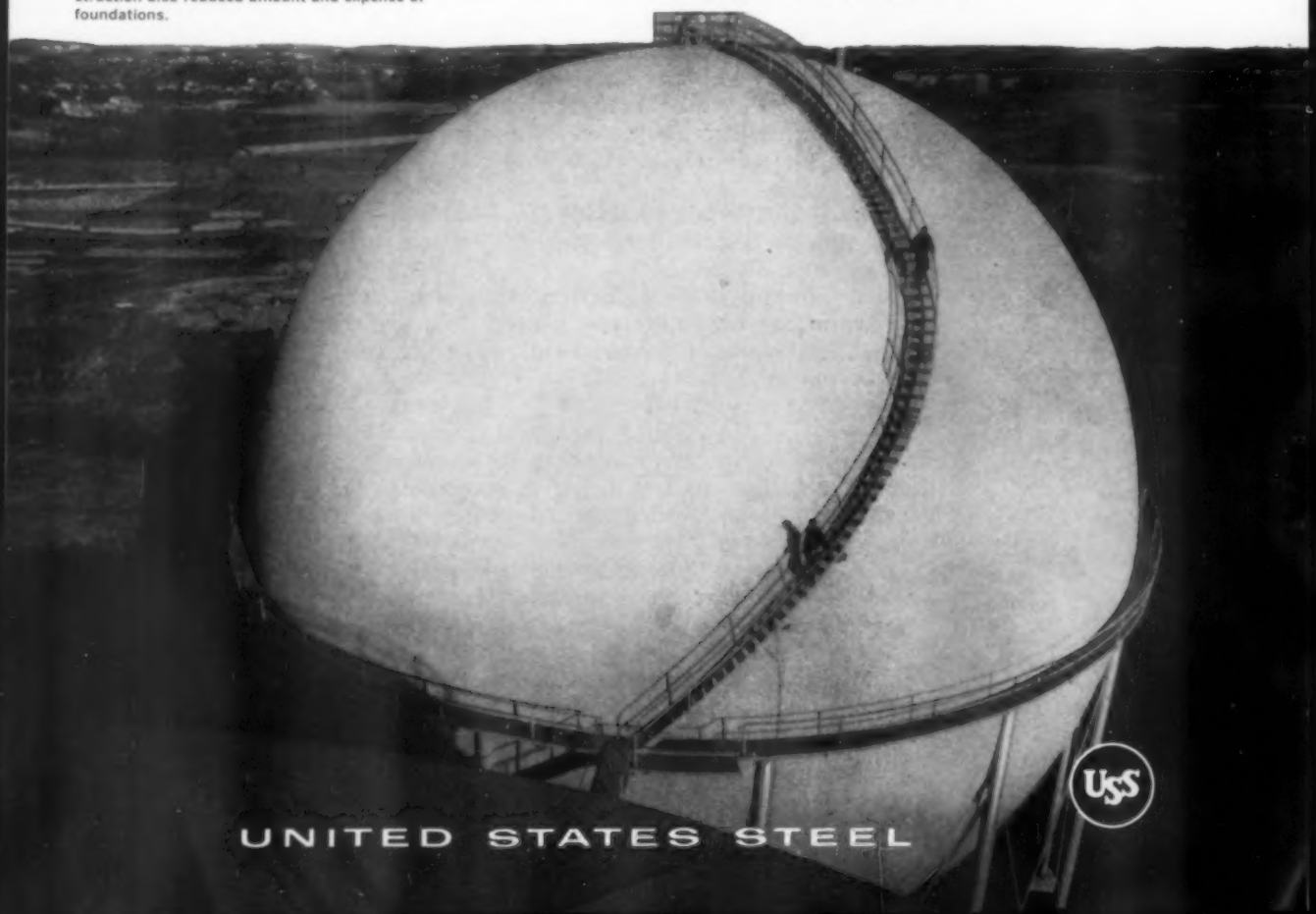
In addition to saving 1,720 tons of steel, the thinner USS "T-1" Steel plates lowered the cost of shipping. And each ton saved meant lower erection, welding and foundation costs. Added up, all these savings point out why the use of USS "T-1" Steel spells economy.

USS "T-1" Steel can be used to improve performance and reduce costs in a wide variety of applications in the petroleum industry—in pressure vessels, in offshore drilling rigs, storage tanks, derricks and other equipment that must be built strong but light in weight. Write for complete information about its application and fabrication. United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

USS and "T-1" are registered trademarks.

Thinner walls meant less weld metal required, less erection time needed. Lightweight construction also reduced amount and expense of foundations.



the OIL AND GAS JOURNAL

January 27, 1958

New Storm Brews Over Imports Plan

Voluntary plan facing double threat from unlicensed Venezuelan cargo and host of new importers wanting quotas. So IPAA moves to put teeth into controls by penalizing all quota violators.

Old-Line Importers Hold the Line

(East of California Imports, Thousands of Barrels Daily)

Company—	December (Actual)	Jan.-May (Average)	Allocation
Old Importers			
Atlantic Refining Co.	49,500	57,700	58,900
Gulf Oil Corp	75,200	109,300	111,600
Sinclair Oil Corp.	56,800	63,200	62,200
Socony Mobil	69,500	67,100	67,100
Standard of California	61,500	63,500	66,800
Standard Oil Co. (N. J.)	58,000	71,300	66,800
The Texas Co.	49,900	50,900	54,500
Total	**420,400**	**483,000**	**493,100**
New Importers			
Cities Service Co.	35,000	33,300	32,600
Crown Central Petroleum Corp.	4,300	6,200	5,000
Eastern States Petroleum Co.	24,700	26,700	18,300
Gabriel Oil Co.	12,700	13,800	7,500
Great Northern Oil Co.	35,200	33,000	33,000
International Refineries	11,000	12,400	12,300
Lakehead Pipe Line Co.	100	300	300
Lake Superior Refining Co.	3,100	5,000	5,000
Northwestern Refining Co.	11,600	16,400	13,500
Phillips Petroleum Co.	16,100	12,400	12,000
Shell Oil Co.	3,000	5,000	7,500
Standard Oil Co. (Ind.)	27,100	30,100	29,800
Standard Oil Co. (Ohio)	12,500	7,500	8,200
Sun Oil Co.	58,100	54,000	50,400
Tidewater Oil Co.	75,500	56,800	34,200
Southwestern Oil & Refining Co.	3,700	3,800	2,900
Bay Petroleum Co.	5,000	5,500	3,200
Dow Chemical Co.	300	300	300
Texas Asphalt & Refining Co.	.....	3,500	2,300
Total	**339,000**	**326,000**	**278,300**
GRAND TOTAL	**759,400**	**809,000**	**771,400**

THE GOVERNMENT'S voluntary crude-import control program suddenly is running into foul weather.

Possible trouble stems from these developments last week:

. . . IPAA executive committee came up with a proposal to end the voluntary arrangement and control imports by putting teeth into the Reciprocal Trade Act.

. . . A meeting in Tulsa of 21 independent producer associations was called for this week to discuss the IPAA proposal for possible joint action.

. . . A refiner started importing without first asking for a quota.

. . . Eighteen new companies requested import quotas so they may get into the importing field. Their combined requests would total about 100,000 bbl. daily.

Huddle in sight . . . The new swing to importing may precipitate an early meeting of the cabinet-fuels committee.

If more quotas are to be issued, the committee faces a big decision: Shall older importers be asked to cut their volume in order to make room for the newcomers?

Position of Capt. M. V. Carson, administrator of the imports program, isn't eased any by failure of domestic demand to increase as hoped. Carson and federal officials had counted on the increases in demand to provide a margin by which imports would be raised.

Present importers generally are staying within the prescribed limits (see table). Reports on actual December entries show imports were actually 11,000 bbl. daily under the recommended level. It was the third

straight month in which the program figure was met.

The IPAA plan . . . The import problem was a major subject of talk at a meeting of the IPAA executive committee in Washington last week.

IPAA President Gordon Simpson of Dallas disclosed after the session that support of all independent oil associations will be sought for a two-point proposal. The plan will be laid before the House ways and means committee when it takes up extension of the trade act within the next 2 or 3 weeks.

The IPAA proposed to add new provisions to Sec. 7, the national security clause which would:

. . . Penalize imports beyond levels specified by the Government.

Penalty would be a duty equivalent to 30 per cent of the cargo's value at point of entry. Importers also would be subject to specific penalties, including damages and confiscation of cargo.

. . . Fix by law the rule that imports of crude oil and products should be at their 1954 relationship to domestic demand.

Simpson estimated the 30 per cent penalty on excessive imports would amount to about $1 per barrel.

He also said that return to the 1954 ratio of imports would cut entries of crude to 720,000 bbl. daily for this quarter, based on Bureau of Mines forecasts.

The 720,000-bbl. figure would require a cut of 270,000 bbl. from the 991,500 bbl. allowed by the voluntary programs for the East and West coasts. Product imports would have to be cut 50,000 bbl. a day.

Simpson pointed out that while importers for the most part are cooperating in the program, a few have refused to do so.

"This experience demonstrates that the success of a program essential to the national security should be a matter of governmental responsibility and should not be left to the discretion of individual parties," the IPAA chief said. "Action must promptly be taken to assure the attainment of the objective of the Government's program to curtain oil imports."

Big challenge . . . A serious threat to the import program came when a cargo of oil destined for Delta Refining Co. arrived at New Orleans this month.

The shipment was the first under a 5-year contract for 20,000 bbl. daily of Venezuelan crude from Superior Oil Co.

Delta, a subsidiary of Southland Co., Dallas, had never applied for an allocation, Carson disclosed. Washington officials said the import was a case of "deliberate evasion" of the voluntary program.

They gave this sequence of events:

E. J. Constantine, Jr., principal owner of Southland, some weeks ago requested information from the Government on import procedures. Carson explained the program and sent the necessary forms to the company to request a quota as a new importer.

Then when Delta suddenly started importing, Carson's query brought this explanation: Delta had increased capacity of its Memphis refinery from 6,000 to 20,000 bbl. daily and could find no domestic crude suitable for its needs.

Delta said further it found a supply in Venezuela at a price that would permit a small profit and contracted for it. Delta explained it assumed it was not necessary to fill out the report forms because it had a contract with Superior.

But Carson countered that such an assumption was "entirely erroneous." All importers are expected to comply with the program regardless of the type of contract or agreement under which foreign crude is secured.

Superior officials in California, meanwhile, declined to comment on the deal with Delta.

What now? . . . Carson did not take the challenge to the program lightly. He said so in a formal statement.

"If Delta Refining Co. and Superior Oil Co. continue with such an agreement, and imported crude oil is being landed in New Orleans without a government-approved import allocation, these two companies will have to share the responsibility for an action which may tend to impair the adequacy of a program designed to enable our domestic oil industry to meet the requirements placed upon it by consideration of national security," the administrator said.

Carson admitted, however, there is nothing he can do immediately except focus attention on the matter if Delta refuses to apply for a quota. The program, being voluntary, has no teeth other than public opinion.

Superior's own imports were covered by the control program for the West Coast, announced last month. Its programed 35,000 bbl. a day through the first half of this year was cut back to 3,000 bbl. The company has not yet reported whether it will cooperate.

The Canadian protest . . . In another sector of the import battle, Washington officialdom indicated that Canada's protest against the new West Coast program would not be answered immediately.

The formal protest was filed 10 days ago. It warned that curbs on oil imports into the U. S. from Canada would "jeopardize" two-way trade benefiting both nations.

The note urged that the program be reconsidered and the limitations on Canadian oil removed.

Washington indicated that the program will be reviewed if the cuts result in injury to Canadian oil production. But at this time it is not believed the program will harm the Canadian industry.

Story in statistics . . . While new imports were erupting, Carson's office released the figures for December operation of the voluntary program.

They showed December imports of 759,400 bbl. daily were 101,100 bbl. above the November level. But they still were 11,000 bbl. under the overall allocation of 771,400 bbl.

The importers' reports showed that estimates for January were increased during the past month. Set at 842,000 bbl. daily as of December 15, they were figured at 865,500 bbl. a month later.

While the December import total was within the quota, this was reached only by cuts made by the old-line importers.

Receipts by this group averaged 420,400 bbl. daily against an allowable quota of 493,100 bbl.

Total entries of the 19 "new importers" were 339,000 bbl. daily, 60,700 bbl. above their quota of 278,300 bbl. Half of the group stayed within their allocations. Imports by the other 10 companies ran from 800 bbl. in the case of Southwestern to 38,700 bbl. in the case of Tidewater above quota.

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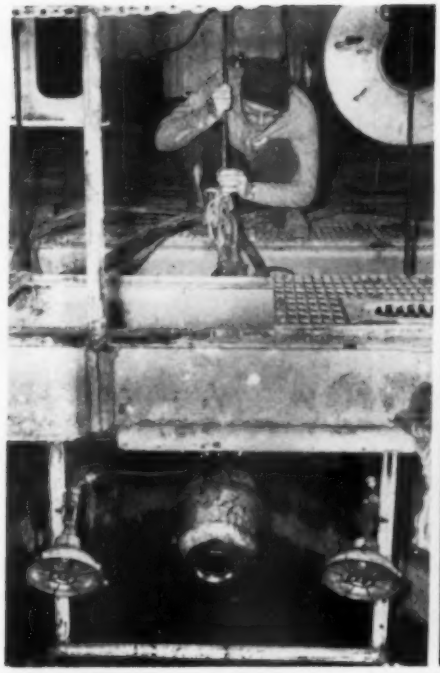
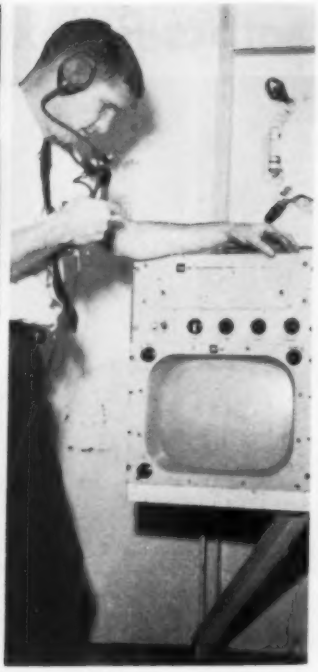




TV CAMERA, flanked by strong lights, photographs ocean-floor operations, sends image to special viewing room on the drilling barge. Drilling Foreman Hal Stratton relays instructions to the driller. With this new technique . . .

TV Helps Drill Offshore Wells

. . . by keeping an eye on operations in water too deep for divers; driller watches as pipe is landed, base cemented.

WHEN OFFSHORE DRILLERS try to land conductor pipe on the ocean floor without help of a diver, they sometimes run into trouble. The pipe may bend or break if it misses the connection and strikes the floor.

Union Oil Co., which has core-drilled in waters 1,500 ft. deep off California, is using a new technique for keeping tab on operations: Underwater closed-circuit television.

The need for TV is peculiar to the revolutionary method for completing wells on the ocean floor in California's deep tideland waters. No diver is used in the operation (OGJ, Oct. 7, 1957, p. 100).

Union oil keeps two complete TV packages aboard its CUSS I drilling barge and has used the camera in depths to 600 ft.

The underwater eye not only eases the job of making connections but it also:

. . . Locates lost circulation trouble spots, such as a leaking connection or a break in the pipe, above the ocean floor.

. . . Checks operations during cementing of the drilling base on the ocean floor.

UNDERWATER CAMERA is protected by an 18 by 14-in. watertight case. The lens window is 6 in. wide and made of glass an inch thick.

Union developed the TV idea because divers are ineffective in deeper waters and can't be used at all below 200 ft. With the TV circuit, Union can use experienced drillers to supervise the critical phases of ocean floor work.

The CUSS I barge is core-drilling in California waters under a joint operation of Union, Shell Oil Co., Superior Oil Co., and Continental Oil Co.

The package . . . The TV camera is inserted in a watertight case for underseas work. The monitor and power unit remain on board.

The camera, mounted on a metal frame, is lowered down guide lines attached to the ocean floor equipment. Attached to the frame are two 375-watt diver's bulbs and reflectors. The lamp power is sufficient to light up undersea objects 20 ft. away.

A 600-ft. cable connects the camera to the monitor room on the bow of the barge. Separate cables provide power to the lamps.

Curious fish provide the only real trouble the drillers have had with the TV system. The fish, attracted by the bright lights, obscure the view. When that happens, the operators turn off the lights for brief periods and hope the fish will go away.

The two TV packages aboard CUSS I cost about $7,500 each. Cohu Electronics, Inc., San Diego, Calif., is the manufacturer.

Soon available . . . Medearis Oil Well Supply Co., Los Angeles, announced last week it soon will market closed-circuit TV units similar to Union's.

The Medearis units will be a little more elaborate. The camera will be housed in a bronze alloy case suspended from a light tripod. The tripod will have a hydraulic-operated device to tilt or "pan" the housing and lights. Remote-controlled motors inside the housing can make iris and focus adjustment.

Medearis reports its equipment will be able to operate in water depths to 1,000 ft. without line amplifiers.

New Rubber Being Produced

GOODYEAR Tire & Rubber Co. has begun producing its new "synthetic natural rubber" on a larger scale at a new $750,000 pilot plant at Akron.

The new product, called Natsyn, is made from isoprene and has the molecular structure and performance characteristics of the tree-grown product. Until now, production has been on a small-batch laboratory basis.

Goodyear says it plans to eventually build a full-scale Natsyn plant with capacity of 25,000 to 30,000 tons annually. But full-scale production, the company said, depends on the availability of isoprene, "and at present the supply of isoprene is inadequate."

Pipeline Contractors Relax in Flordia Between

R. H. Fulton, R. H. Fulton & Co., Lubbock, Tex., and D. M. Curran, M. J. Crose Manufacturing Co., Tulsa.

V. V. Malcom, Perrault Equipment Co., Tulsa; E. J. Mahoney, Jr., and W. L. Kennedy, Jr., both of Bechtel Corp., San Francisco.

C. M. Collins and Marvin Jones, Williams Brothers Co.; C. Paul Evans, M. J. Crose Manufacturing Co.; and John H. Williams, Williams Brothers.

W. B. Haas, Northern Natural Gas Co., Omaha, and Louis I. Pentzien, Pentzien, Inc., Omaha.

Transco Head Optimistic About Future

THE GAS transmission industry faces serious—and in some cases critical—problems in the high cost of money, increasing gas prices, inflated construction costs, and a confused regulatory situation.

But after surveying industry conditions, together with a growing supply and demand, Tom P. Walker, chairman of Transcontinental Gas Pipe Line Corp., concludes that the whole pipeline world is not about to come to an end.

"There is a telling pressure which will not be denied to get clean, efficient natural gas to hungry markets," he told the annual Pipe Line Contractors Association meeting in Boca Raton, Fla., last week.

Walker took issue with the recent statement of a leading pipeline-company executive that "the bloom is off this business."

He concedes there is a smaller need for new long lines, but says the present market is far from saturated.

He sees nothing that cannot be overcome to clear the way for continued substantial growth of natural-gas pipelines. His own company's $139-million expansion is evidence of his optimism.

Tight money . . . To allay the fears of those who expect high interest rates to deter expansion, the Transco chairman cited the experience of the electric-utility industry.

"It was during the 20's when the

Business Meetings at Annual Convention

W. O. Dixon, Perrault Equipment Co., Tulsa, and A. K. Barlow, McVean & Barlow, Inc., Odessa, Tex.

James P. Neill, Western Construction Co., Dallas, retiring association president; Paul Reed, The Oil and Gas Journal, Tulsa; and Harold C. Price, H. C. Price Co., Bartlesville, Okla.

R. J. O'Connell, T. A. Hester, and M. W. Staples, all of Oklahoma Pipe Line Constructors, Dallas.

C. C. Bledsoe, Midwestern Constructors, Inc., Tulsa, and Ray L. Smith, Ray L. Smith & Son, Inc., Eldorado, Kans.

electric utilities had their greatest period of expansion. Money was really high then . . . The fact that rates were high did not seem to deter the companies from going ahead because they were making a necessary service more widely available and efficient."

They, too, were harassed by government regulation and congressional investigation. And interest rates were higher than today, he said.

"This leads me to the thought that if a project is clearly in the public interest, a way will be found to finance it and permit it to prosper," he continued. "I need not argue that eager markets await the increasing quantities of natural gas being uncovered each year. Somehow or another gas-transmission lines will get the two together."

Higher return needed . . . Walker said an increase in gas pipelines' allowed return from 6 to 7.6 per cent would be necessary to provide the same yield to investors which FPC originally agreed was fair and reasonable. Higher interest rates are the reason.

The cost of long-term money is of particular importance to the health of pipelines because debt in the typical company's financial structure amounts to 70 per cent of total capitalization. Preferred stock accounts for about 10 per cent and common 20 per cent.

Walker noted that most of the major lines were built when 20-year money was cheap—3 per cent or lower. Then a 6 per cent return permitted by the Federal Power Commission was adequate to compensate all investors and attract capital. Assuming bonded interest at 3¾ per cent and a preferred dividend rate of 4½ per cent, the rate for common dividends and surplus would be 14.6 per cent. With a 70 per cent payout of earnings, the common yield could be 10 per cent.

Today, the same 6 per cent return applied to current prices for debt and

preferred money would permit only 4¾ per cent dividend yield for common stock—well below the yield of other types of enterprises. Hence the common investor is rather cool toward pipeline stocks, which in turn impairs a company's credit and raises the bond and preferred rates demanded by financial houses.

However, Walker sees some hope of recognition of higher interest rates from FPC.

"Both the state and federal commissions have in the past recognized the effect of higher money costs on rates to utilities and have permitted necessary increases," he said. "I think we can anticipate that they will do so in the future because they have a very real responsibility in the public interest to maintain the financial integrity of the utilities which they regulate."

Inflation, competitive fuels . . . With increased wellhead prices for gas and construction costs up 36 per cent since 1952, Walker warned against the danger of gas pricing itself out of the market for some uses.

"At some point, certain uses of gas which are essential to the prosperity of the pipeline can be priced completely out of the market so that an increase in rates will do no good," he said.

If gas becomes more expensive than coal or fuel oil for industrial and boiler fuels, then the industry is in trouble. "This is a segment of our business which pays the highest return because it uses facilities not required to meet firm committments," he pointed out. He charged the coal industry currently is exerting every effort to bring this very situation about through legislation.

"Golden age of gas" . . . Curtis M. Smith, vice president of Tennessee Gas Transmission Co. and president of Southern Gas Association, points to the continued growth of reserves and demand for natural gas as evidence we are in a "golden age of gas."

Smith, speaking to the Pipe Line Contractors Association last week, cited these prospects in predicting a high level of construction for years to come:

. . . Gas pipeline mileage, not including field lines operated by independent producers, has grown 200,000 miles to 545,700 miles in the past 10 years, and another decade may see the total exceed 750,000 miles.

. . . Gas utility customers, numbering 30,386,000 last year, are expected to increase to 33,500,000 in 1960 and 38,000,000 by 1965.

. . . Over $5.2 billion will be spent on transmission and distribution lines in the next 3 years.

. . . Marketed production of natural gas is expected to double in 20 years.

"This means, of course, that somebody is going to have to build a whale of a lot of pipeline if these customer requirements are to be met," Smith said.

Contractors Elect Gregory

R. P. GREGORY, vice president of Houston Contracting Co., was elected 1958-59 president of the Pipe Line Contractors Association last week.

John H. Williams, president of Williams Brothers Co., Tulsa, was re-elected first vice president; James W. Sharman, president of Sharman, Allen, Gray & Taylor, Inc., Houston, was elected second vice president; and E. G. Morrison, president of Western Pipe Line, Inc., Austin, Tex., was elected treasurer.

R. P. GREGORY

Newly elected directors are O. R. Burden, president of O. R. Burden Construction Corp., Tulsa; T. A. Hester, managing partner, Oklahoma Pipe Line Constructors, Dallas; Felix M. Johnson, president of Trojan Construction Co., Inc., Oklahoma City; James P. Neill, of Western Construction Co., Dallas, retiring president of the association; Harold C. Price, president of H. C. Price Co., Bartlesville; and R. B. Somerville, president of Somerville Construction Co., Ada, Mich. C. C. Bledsoe, vice president of Midwestern Constructors, Inc., Tulsa, and Robert A. Conyes, president of Conyes Construction Corp., San Pablo, Calif., are holdover members of the board.

The association awarded honorary memberships to Burt E. Hull, consultant, retired pipeline-company executive, and one of the most renowned figures in pipelining, Dallas; Ray L. Smith, president of Ray L. Smith & Son., Inc., El Dorado, Kans.; and I. C. Little, pioneer pipeline contractor, Dallas.

New Mexico Flood

would double recovery for Cities Service at Caprock.

WATER FLOODING may spread to a new front in the Caprock Queen sand field of southeastern New Mexico.

Cities Service Oil Co. hopes to increase ultimate recovery from 22 per cent to 47.6 per cent of original oil in place by flooding its acreage in Chaves County near the center of the big pool.

The New Mexico Oil Conservation Commission is studying a Cities Service request for authority to operate a pilot flood on 320 acres of its 1,480-acre block. A decision is expected early next month.

The project would be the third water flood for Caprock within recent months. Other pilot projects are being carried out 8 miles north of the Cities Service acreage by Graridge Corp. and Ambassador Oil Corp.

Cities Service plans to inject 400 bbl. of water per day in each of four input wells on a five-spot pattern. If the flood is expanded to include the entire 1,480-acre lease, Cities Service engineers estimate an additional 4,250,000 bbl. of oil would be recovered. The acreage has already produced about 2,700,000 bbl. of oil. Another 900,000 bbl. is recoverable through primary means.

The company's wells are making about 20 bbl. of oil per day. Allowable for southeastern New Mexico is 37 bbl. per day per well. The Cities Service pilot would be in the newer part of Caprock, formerly known as the Drickey area, developed in 1953. The company operates 40 wells.

The solution-gas drive field covers about 24,000 acres, with 600 wells producing from the Queen sand found at about 3,000 ft.

The Graridge project, which covers about 720 acres, was recently the sounding board on whether or not to grant capacity allowables for a water-flood program (OGJ, Nov. 11, 1957, p. 124). The commission granted Graridge's application for capacity allowables for 12 water-flood wells. Cities Service did not seek capacity allowables in its application.

IPAA Takes on New Look

FIRST MAJOR reorganization in the 29-year history of Independent Petroleum Association of America was approved last week by IPAA executive committee members meeting in Washington.

Minor S. Jameson, Jr., assistant to the president of IPAA since 1951, has

been elected executive vice president under the new program. He will coordinate activities of five newly created departments and direct the overall program of the association. Russell Brown, general counsel in Washington, will continue to be directly responsible to the IPAA president.

Department heads include I. C. Huff, Jr., executive manager and secretary, who will head the administration and finance department; B. H. Vickrey, head of the membership department; Lloyd N. Unsell, director of the information department; and Jameson, who will head both the economic and the statistical departments. Four district representatives working directly with IPAA members will be responsible to Vickrey.

Utah Can't Decide

on drilling pattern for pools in lush Four Corners area.

OIL OPERATORS in Utah are divided on whether to have 40-acre or 80-acre spacing for several important pools in the rich Four Corners area.

After a week of hearings on spacing for Ratherford, Desert Creek, and White Mesta fields, the Utah Oil and Gas Conservation Commission recessed the case until February 24 to allow more time to gather evidence.

Shell Oil Co. wants 40-acre spacing. An 80-acre pattern is supported by Continental Oil Co., Superior Oil Co., The Texas Co., Phillips Petroleum Co., Three States Natural Gas Co., Sinclair Oil & Gas Co., Carter Oil Co., Aztec Oil Co., Sunray Mid-Continent Oil Co., and Skelly Oil Co.

Aneth spacing studied . . . Earlier this month, the commission estabiished a temporary 80-acre pattern for the big Aneth field just north of the area involved in the other spacing order.

But the order will be in effect only to June 2. Another hearing is set for May 6 to determine if the 80-acre pattern should be permanent, or if a 40-acre pattern should be used.

Bisti spacing changed . . . On the New Mexico side of the Four Corners area, the New Mexico Oil Conservation Commission last week reversed an earlier order for 40-acre spacing at Bisti field. The new pattern will be 80 acres until February 28, 1959. At that time a new hearing will be held.

The reversal was a victory for Sunray Mid-Continent Oil Co., which had asked for 80-acre spacing in September, but met strong opposition from Shell Oil Co. and Gulf Oil Corp.

How Oil's Biggest Stack Up

	JERSEY	SHELL
Reserves	26,940,000,000 bbl.	13,477,000,000 bbl.
Refinery runs*	2,249,000 b/d	2,069,000 b/d
Owned tanker capacity	2,570,000 dwt.	2,662,000 dwt.
Chartered tanker cap.	3,736,000 dwt.	5,447,000 dwt.
Pipelines wholly owned	9,002 mi.	7,086 mi.
Pipelines partly owned	9,792 mi.	11,295 mi.

*First 9 months of 1957.

Jersey, Shell Are Close Rivals

IF OIL in the ground is like money in the bank, Jersey Standard is far wealthier than Royal Dutch-Shell. Otherwise, the two biggest U. S. and foreign oil companies are surprisingly alike.

Standard Oil Co. (N. J.) recently made a stock offer to its shareholders, and Royal Dutch is in the process of doing the same.

Interesting comparative data is offered in the prospectus issued by each company.

Only in reserves is there a distinct disparity. Jersey reserves are double those of Shell's — nearly 27 billion barrels of crude and distillate for Jersey to nearly 13.5 billion for Shell.

Jersey tops Shell slightly in refinery capacity. Jersey-owned and operated refineries ran nearly 2¼ million barrels per day the first 9 months of 1957, while Shell's 30 refineries in 15 countries ran slightly over 2 million. Shell owns 202 tankers and now has another 293 under charter. Their total deadweight tonnage is 8,109,000. Jersey owns 178 tankers and has 196 more under charter. Their deadweight tonnage is 6,306,000.

Both companies disclosed huge tanker expansion plans. Jersey will build 72 with a total deadweight tonnage of 2,954,000. Thirty-four of them will be in the 47,000-ton class. Shell is building or has ordered 21 tankers with a total tonnage of 806,000 and has the "right and obligation" to 148 other tankers on order or under construction. Shell's expansion would add 4,110,000 tons.

The pipeline mileage of the two firms is almost the same, although Jersey owns outright about 2,700 more miles than Shell.

The two international oil giants own about one-fifth of the world's refining capacity. They own or charter nearly one-third of the tanker tonnage.

	Barrels	
Reserves by area	Jersey	Shell
United States, Canada	4,340,000,000	1,517,000,000
Venezuela	7,300,000,000	3,144,000,000
Other Western Hemisphere	150,000,000	262,000,000
Europe, Africa	195,000,000	136,000,000
Middle East	14,800,000,000	7,780,000,000
Far East	155,000,000	638,000,000
	Barrels daily	
Refinery runs by area*		
United States	779,000	551,000
Other Western Hemisphere	1,169,900	654,000
Europe	301,000	601,000
Far East	None	263,000

*First 9 months of 1957.

Drilling Cost-Price Squeeze Tightens

FOR DRILLERS, there was nothing strange in the economic downturn experienced in 1957 by the general economy.

Drilling contractors had felt a classic squeeze for 4 years. It only became a little tighter last year.

Here's the picture:

. . . Total rotary-drilling costs reached 206 per cent of the 1941 average last year. This was a 5 per cent rise within 12 months.

. . . Prices for drilling in the same or similar fields to comparable depths dropped to 90 per cent of the 1941 figures. This represented a 3 per cent decline.

These developments were among the highlights of the annual statistical report of the American Association of Oilwell Drilling Contractors. The report underscored the plight of the contractors with another contrary set of facts:

The price per foot paid the drilling contractor last year fell to a 10-year low of $4.60.

On the other hand, the total cost per foot drilled, including costs of materials and services as well as the contracting cost, rose to an all-time high of $14.

This means that contractor charges to the operator accounted for only 32.8 per cent of the total drilling cost. These charges accounted for 55 per cent of total drilling costs in 1945. And the drop lends credence to contractors' claims that their prices are lagging badly.

Standstill on efficiency . . . Another fact turned up by the summary sheds new light on the contractor's ability to do something about the economic trends affecting his business.

In the past, well-managed contracting firms have survived higher costs and lower prices by stepped up drilling efficiency.

But in 1957 this efficiency, as measured by average drilling time, stood still. It was reported at 54 per cent of the 1941 time, the same as last year.

The AAODC report credited the unchanged drilling time to continued use of older and less efficient rigs. Purchases of new rigs for domestic operations were at a very low level during the year.

Wells go deeper . . . The average oil well went deeper in 1957 than ever before.

Average depth was 4,120 ft., compared to 4,022 ft. in 1956 and 4,044 ft. in 1955.

Despite the greater depths, total footage drilled fell more than 13,000,000 ft. because of the sharp decline in number of wells drilled during the year.

The AAODC estimated total wells drilled at 53,668, a 4,603 or 7.9 per cent decline from 58,271 wells drilled in 1956.

AAODC officials laid the blame for this decline on the softening of the general economic picture, lowered consumption of petroleum products, continued heavy imports, and higher

Contractor's Share of Total Well Outlay Drops

Year	Total New Wells Completed	Average Depth (per well)	Average Contract Cost (per foot)	Average Total Cost (per foot)
1935	24,851	2,760	5.00	8.00
1936	28,962	2,797	4.75	7.75
1937	35,213	2,985	4.50	7.50
1938	29,127	3,110	4.25	7.50
1939	28,012	3,053	4.25	7.50
1940	31,149	3,088	4.00	7.50
1941	32,510	3,056	4.25	7.25
1942	21,990	3,088	4.00	7.50
1943	20,349	3,046	4.50	8.00
1944	25,786	3,272	4.75	8.25
1945	26,649	3,489	5.00	9.00
1946	30,230	3,345	5.00	9.50
1947	33,147	3,404	5.00	10.25
1948	39,477	3,463	4.75	10.75
1949	38,962	3,558	4.75	10.75
1950	43,204	3,689	5.00	11.00
1951	44,196	3,869	5.50	11.50
1952	45,879	4,060	5.85	12.00
1953	49,279	4,016	5.60	12.50
1954	53,650	4,025	5.10	12.75
1955	56,850	4,044	4.90	13.25
1956	58,271	4,022	4.75	13.50
1957*	53,668	4,120	4.60	14.00

*Estimated.

Drillers' Dilemma: Costs Up, Prices Down

(All figures in per cent)

	1941	1945	1950	1951	1952	1953	1954	1955	1956	1957
Labor Costs	100	140	190	196	197	198	200	202	204	208
Equipment Cost	100	110	175	180	183	188	190	195	200	205
Miscellaneous Costs	100	120	175	181	185	188	191	194	199	204
Total Rotary Drilling Costs	100	122	180	186	189	192	194	197	201	206
Drilling Prices (footage basis)*	100	115	100	103	103	102	99	96	93	90
Average Drilling Time†	100	95	65	60	59	58	56	56	54	54

*For drilling in same or similar fields to comparable depths. †"Rate of Penetration" has been dropped because of its close relationship to drilling time in days.

cash outlays for foreign drilling operations.

The contractors are still doing the bulk of drilling work. They drilled 93 per cent or 49,911 wells of the 53,668 put down. To accomplish this, they operated an average of 2,842 rotary rigs, a decline of 220 rigs from the number operated the year before.

New Canadian Play

at Kaybob attracts highest bids at Alberta lease sale.

FRENCH PETROLEUM CO. of Canada plunked down nearly $1 million for two 320-acre tracts in the promising Kaybob-Iosegun area 150 miles northwest of Edmonton.

The two leases brought the highest bids at a recent Alberta crown lease and reservation sale, which netted the provincial government $5,521,722.

French Petroleum paid more than $1,836 per acre for one tract just east of the Kaybob discovery well which tested 110 bbl. of oil per hour from the Slave Point-Middle Devonian at 9,600 ft. last May (OGJ, Dec. 23, p. 107).

The other expensive lease cost the company more than $1,148 per acre. It is a few miles southeast of Kaybob and 2 miles northeast of the Iosegun discovery which came in for 130 bbl. per hour from the same zone last September. The other 320-acre tracts in the same area went to Atlantic Refining Co. for $607,051.

The sale brought successful bids on 65 parcels, including, 27 tracts of proven or semiproven acreage in the Pembina area. Companies paid $2,037,098 for the Pembina acreage. Highest per-acre Pembina bid was $711.88 for a 320-acre lease acquired by Bailey Selburn Oil & Gas, Ltd.

Reservation rights on 92,160 acres about 75 miles southwest of the Kaybob-Iosegun area were sold to Texaco Exploration Co., which paid a cash bonus of $601,088.

Kaybob area hot . . . The Kaybob and Iosegun discoveries are located in one of the hottest exploration regions in western Canada.

The play began last February when Home Oil Co., Ltd., et al, found Slave Point production at Virginia Hills.

A few weeks later, the same operator made a similar discovery at nearby Swan Hills. Another wildcat found good pay at Edith Lake. These discoveries were followed by the Kaybob and Iosegun strikes.

watching WASHINGTON

. . . with Bertram F. Linz

• Government says: Pay the piper

THE ADMINISTRATION'S IDEA that those who benefit from government services should pay for them is bringing protests from barge operators.

The Government has been working out its plans for some time. As a guidepost it took the $35-billion road program, to be financed from special taxes on gasoline and certain other items.

This month President Eisenhower asked Congress to take another step in the same direction. He urged higher fees for public-land leases and patents and charges to employers of longshoremen for the cost of administering disability compensation.

Other actions are in the planning stage. They include charging fees to users of the inland waterways. Barge operators see the reaching hand of the railroads in this and are fighting back.

The waterways operators warn that tolls would seriously weaken the barge industry, already operating on a slim margin. They contend this, in turn, would hamper the nation's transportation in the event of war.

River ports to whose prosperity barge operators are an important factor also will fight the idea. So any effort to impose fees could add another to the many issues in Congress.

• Soviet offer is tough to match

ADMINISTRATION OFFICIALS are disturbed over plans of some Latin American countries to turn to Russia for aid in developing their oil resources (OGJ, Jan. 20, p. 101).

There is little they can do about it, however. The only argument they could offer is money. And there is no way the U. S. could provide this under present law.

Both the Export-Import Bank and the International Bank for Reconstruction and Development are possible sources for loans. But the law provides that the Export-Import Bank shall not compete with private capital. And the International Bank can't make loans for highly speculative ventures, such as wildcatting.

A handful of Latin American countries have opened their oil lands to private development. But others have nationalized oil industries. It is among the latter group that Russian penetration of this hemisphere is a possibility.

Washington is watching Argentina and Brazil closely, while pondering what to do about it.

• Chilled avgas pays off in Arctic

ARMY ENGINEERS have found a way to improve aviation gasoline—put it in an ice box.

That actually is what they have done in the Arctic. Two years ago an Arctic task force dug a 1,200-ft. tunnel through the icecap to test the idea of using ice chambers for storage of military supplies.

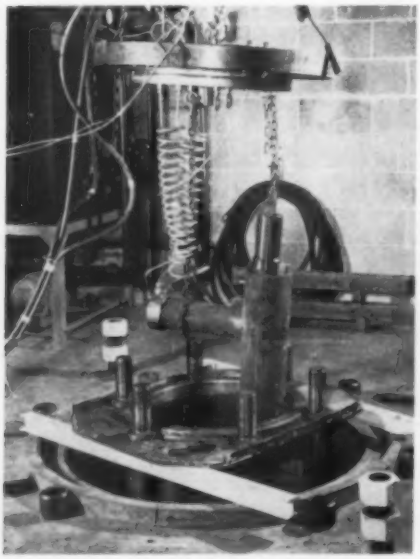
As part of the work some pits were sunk and filled with gasoline. The pits were covered with plywood and sealed by ice slush when work was stopped at the beginning of winter.

The pits were opened last summer. None of the fuel had evaporated, and it was in better condition by reason of its 7-month aging. The gasoline actually contained less moisture.

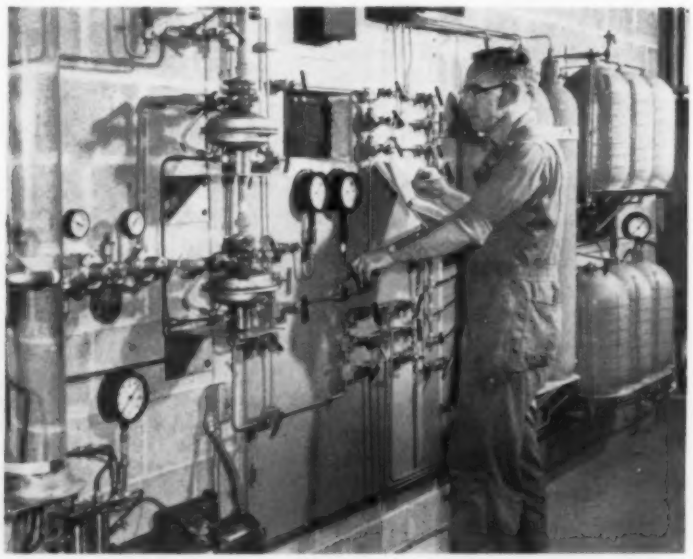
Gasoline evaporates rapidly and takes on other impurities under normal climatic conditions. But the Army engineers conclude that it can be stored indefinitely under the icecap, where a 15° temperature is almost constant.

FIRST STEP in determining actual perforating performance involves drying a core, then saturating it with salt water to duplicate reservoir condition of rock filled with connate water.

SECOND STEP: Prepared core is cemented in test receptacle, which is welded to section of casing.



THIRD STEP: Core receptacle, casing section, and perforating gun are lowered into pressure chamber.



FOURTH STEP: Lane-Wells' Bill McPhee discharges perforator, then runs flow-permeability test under actual well pressure and temperature conditions. The result: A "well-flow index."

Tests Measure Perforating Efficiency

THE OLD IDEA that depth of penetration determines the effectiveness of well perforating is falling by the wayside.

Penetration depth still is important. But more important now is the "well flow index"—the relationship between the well's permeability before and after perforating.

New methods for testing bullet and shaped charges were unveiled last week by Lane-Wells Co. at its new Los Angeles laboratory. Facilities used to establish the effectiveness of various types and sizes of perforations under simulated well conditions are greatly advanced from the test barrels which have been the standard until now.

Lane-Wells' method (photos) permits a direct comparison of perforating efficiency by producing a well flow index. This index is the ratio of the flow in the perforated core to that in the original core.

In a typical test, cores of Berea sandstone are conditioned to specific hydrocarbon and salt-water saturation. Permeability is then determined before and after perforating to provide the well flow index ratio. Controls enable lab engineers to regulate temperatures and pressures and to determine permeability characteristics over wide

pressure differentials between the bore hole and the formation.

Standard conditions at which perforating is carried out and the final permeability determined include temperatures of 190° F., "formation" pressure of 1,500 psi., and a pressure differential of 200 psi.

Results of the past year's operation of the laboratory, in which every known type and size of perforator has been tested at pressures and temperatures exceeding those encountered in the field, have established a well flow index for each size and type of perforation. From these indexes the petroleum engineer can more accurately determine the type of perforation most likely to produce maximum oil under any given set of well conditions.

FPC Rate Approval

is first clear-cut increase since Memphis decision.

THE FEDERAL Power Commission has approved the first clear-cut rate increase for a natural-gas pipeline company since the Memphis decision.

The increase, granted to Texas Gas Transmission Corp., will permit collection of about $10,180,000 of annual increased revenues beginning January 20.

The FPC order makes the new rates final for all of Texas Gas' customers, with the exception of one pipeline customer — Texas Eastern Transmission Corp. Texas Eastern has given conditional consent to an increase which amounts to $295,500 per year, but the new rate will be subject to refund if the FPC denies the increase.

The new rates resulted from a filing made by Texas Gas on December 20, 1957, for $1,457,000, in addition to an increase of $8,723,000 per year filed at an earlier date. The latter increase has been collected since last February, subject to refund.

Bond required . . . Last week, the FPC also issued an order putting a proposed $5,399,000 annual increase by United Gas Pipe Line Co. into effect December 1, 1957. But the company is required to file a bond or equivalent assurance for refund if the rates are later disallowed by the FPC.

This is the second time since the Memphis decision that the FPC has required a bond up to the full amount of the rate increase. A similar order was issued late in December for a rate increase by El Paso Natural Gas Co.

Processing briefs

The 1959 mid-year meeting of the API Refining Division has been rescheduled to tie into the Fifth World Petroleum Congress. Both meetings will be held in New York.

The API meeting will be May 27-29 and the Congress May 31-June 6. About 5,000 oil men from 45 countries are expected for the Congress. Many will also attend the API meeting, which is the largest refiners conclave held in the U.S. each year. The API refiners meeting this year is set for May 12-15 in Los Angeles.

Humble Oil & Refining Co. is expanding facilities at its Baytown, Tex., refinery to increase paraxylene production almost 50 per cent. Upon completion of the expansion program Humble's paraxylene unit will have the largest capacity of any such unit in the nation. Paraxylene is a raw stock used in making synthetic fibers such as orlon and dacron.

The expansion, scheduled for completion in July, will boost production capacity to about 66,000,000 lb. a year. Present output is 44,000,000 lb. annually.

An explosion and fire at United Rubber & Chemical Co.'s Baytown, Tex., synthetic-rubber plant last week killed three persons and injured three others.

Production at the plant will be curtailed for several months as a result of the blast, which was described as the worst industrial accident in the city's history. Two buildings were demolished, and an estimated 25 to 30 per cent of the plant facilities were destroyed.

The Texas Co. has completed converting its 9,000-bbl. per day fixed-bed hydroformer at the Lockport, Ill., refinery, to a Platformer. The unit is tied into a new Unifining unit of the same capacity, processing an intermediate Mid-Continent straightrun naphtha.

Another Unifiner is under construction at Lockport. It will pretreat the naphtha feed stock going to Texaco's original Platformer, put on stream in 1955. Both have a capacity of 10,000 bbl. per calendar day. This gives Texaco 11 Platformers in operation, plus two more on the way.

Foster Wheeler Corp. has teamed up with Ishikawajima Heavy Industries Co., Ltd., of Tokyo to form Ishikawajima Foster Wheeler Co., Ltd. The firm will sell, design, engineer, and construct process plants in petroleum, chemical, and other fields. Ishikawajima, one of the oldest heavy industrial corporations in Japan, has been an exclusive licensee of Foster Wheeler in the boiler and condenser fields.

U. S. Industrial Chemicals Co. has added a new sulfuric-acid decomposition and purification unit at its Sunflower, Kans., plant. Capacity of the new unit is 70 tons of alkylation-spent acid per day. The regenerated sulfuric acid product is identical to that produced from sulfur. The new facilities push total capacity of the Sunflower plant to 250 tons per day on a 100 per cent sulfuric acid basis.

A new plant to manufacture special-purpose synthetic rubbers is being built at Arnhem, Holland, by B. F. Goodrich Chemical Co. of Cleveland, and Algemene Kunstzijde Unie, N. V., of Arnham. The plant wil be operated by a newly formed company.

Scheduled for completion by mid-1959, the plant will produce a butadiene-styrene type latex high-styrene reinforcing polymer, and nitrile latex.

Also for Refiners . . .

IN THE NEWS: Refiner importing unlicensed cargo of Venezuelan crude provides spark for new storm over imports control (p. 123) . . . Carter research lab may be taken over by another Jersey affiliate (p. 137) . . . A higher depletion rate of shale is recommended by former Colorado governor (p. 137) . . . Canadian firms budget heavy expenditures in 1958 (p. 138) . . . Clark is modernizing its Blue Island refinery in Illinois (p. 139) . . . Finns' claim to northernmost refinery disputed by Canadians (p. 140) . . . India and Burmah Oil sign development deal (p. 143).

PLUS THESE TECHNICAL REPORTS: Refinery runs will be up in 1958 (p. 170) . . . Look for more alkylation (p. 172) . . . Gas-liquids production hits new high (p. 176) . . . Ethylene still leads petrochemical growth (p. 179).

Mexico Eyes U. S. Gulf

. . . in tidelands dispute now before Supreme Court. Texan claims delay in decision is preventing offshore oil activity.

TEXAS OFFICIALDOM bubbled with renewed indignation last week over federal efforts to roll back the state tidelands boundary to 3 miles in the current action before the Supreme Court.

Prime catalyst for the hubbub was a report that Mexico, in a near-fantastic legal move, may lay claim to a 7½-mile wide strip of tidelands extending the length of the Texas coast.

The report has it that Mexico might claim the area between the 3-mile and 3-league (10½-mile) lines if the U. S. Supreme Court holds that Texas does not own it.

The report came from Neville Penrose, Fort Worth independent operator and a former chairman of the Texas Good Neighbor Commission, a group seeking to improve Texas-Mexican relations.

Penrose recently was honored for this work at a ceremonial dinner in Mexico. He said he learned then from a prominent Mexican attorney that the tidelands claim is under study by Mexican lawyers of high repute.

The basis for such a claim from the Mexican viewpoint, Penrose said, is that Mexico recognized the former Spanish boundary of Texas, 10½ miles, when the war with Texas ended.

Thus, the Supreme Court, with a 3-mile ruling, would be repudiating ownership of the 7½-mile belt from Brownsville to Louisiana. It would, in effect, be saying that the full Spanish title never was conveyed to the Republic of Texas. And if the U. S. says the area doesn't belong to Texas —then it still belongs to Mexico, the Mexican argument goes.

The Mexicans, Penrose said, find the situation amusing. It appears to them that the U. S. is trying to sue itself out of valuable lands.

Officials respond . . . The Mexican report caused Earl Rudder, outgoing Texas land commissioner, to take another swat at the U. S. Government.

The Government's view on offshore boundaries, Rudder said, opens the way for "Mexico, Russia, or anybody" to claim the area beyond 3 miles.

"The federal Government says, in effect, that Texas can't possibly own more than 3 miles out in the Gulf of Mexico because that is as far out as the U. S. extends," he said.

"I simply cannot conceive of a nation like the U. S. taking such a position. The 3-mile limit was set at a time when that was the distance which coastal guns could defend.

"In this age, unless the U. S. controls well beyond its shoreline, Russia, Mexico, or anybody else can claim it. It is imperative that we control at least to the edge of the Continental Shelf. It not only is rich in oil and minerals but also vital to our defense."

The money issue . . . Rudder said the unreasonable harassing tactics of the federal Government are causing great hardship to both the state and the oil companies.

Texas now has taken in almost $20 million in lease bonuses in the disputed area of the Gulf, plus another $1,471,706 in lease rentals. Bonuses paid by oil companies for leases in the disputed area average $62.46 an acre.

However, Rudder said, the state has actually received only $103 in royalties from oil and gas production beyond the 3-mile line. Another $59,490 is held pending a final decision on whether the state or federal Government gets the money.

Further, several producing wells are shut in awaiting future developments in the legal battle. The federal Government alone, Rudder said, is responsible for the meager royalties and lack of activity.

In a further rundown, Rudder said Texas had received more than $40 million in bonuses, rentals, royalty, and exploration fees within 3 miles of the coast. All except about $9 million came from oil and gas operations. The $9 million came from sulfur leases.

Texas now has leased 183,161 acres of the 869,591 acres within the 3-mile limit.

Since the first tidelands lease was granted by Texas in 1922, 131 wells have been drilled. As of late last year, 14 wells were producing and 31 were shut in.

Government attitude . . . Meanwhile, in Washington, it was apparent the federal Government is in no big hurry for a quick settlement of the tidelands lawsuit.

Solicitor Gen. J. Lee Rankin laid a procedure before the Supreme Court making it unlikely that the case could be argued this term. In any event, no decision would come prior to the 1958-59 term in October.

Rankin suggested the Government be granted 60 days to file its brief and the states 60 days to reply. That would make arguments in the case impossible before the summer recess starts in June.

The department stated its views in a motion opposing the Gulf states' request for a pretrial conference to set the length and order of argument.

The Government does not object to such a meeting if the court believes it would help. But there is no need for it, Rankin said.

Rankin told the court the suit should be decided "on the basis of the pleadings, briefs, and argument." But "it appears to the United States premature to fix the order or time of argument now."

Alabama's case . . . A cross-bill filed by Alabama, asking the court to declare its boundary to be 6 leagues from the shore, should be dismissed, Rankin said.

"This goes beyond the issue as posed in the amended complaint . . . which relates solely to rights in the submerged lands and resources thereof as granted by Congress," he charged.

"Under the Constitution a state may not sue the United States without its consent. Congress has not consented either in the Submerged Lands Act or elsewhere."

The lawsuit originally filed against only Louisiana, was broadened by the court last year to take in all five Gulf states.

The states submitted their answers to the Government's petition last month.

"None of these answers raises any genuine issue as to any material fact," Rankin said. "The issues, as framed by the pleadings, are whether the various states were granted submerged lands and the resources therein only to the extent of 3 miles from the coast, or 3 leagues.

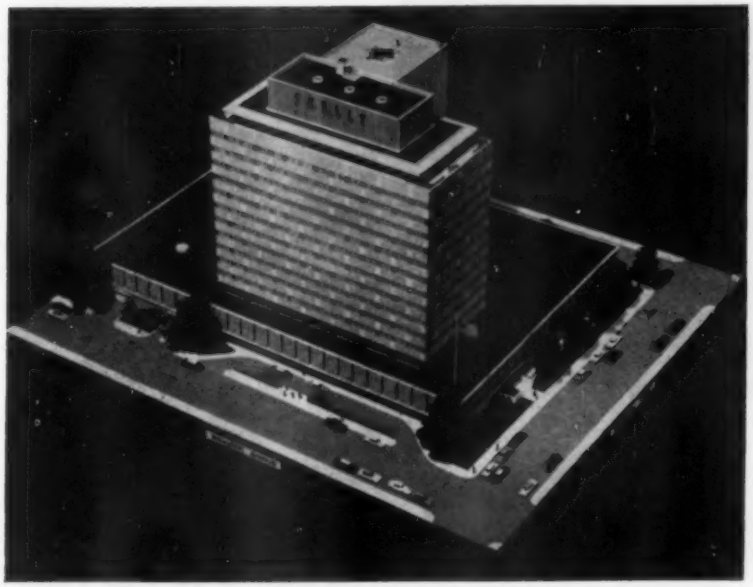
"This depends upon the proper interpretation of the Submerged Lands Act in the light of certain historic data of which the court may take judicial notice. For these reasons the U. S. submits that the case should be decided on the basis of the pleadings, briefs, and argument."

Governor speaks up . . . Back in Texas, Gov. Price Daniel, in an address at Dallas, blasted the federal action in the Supreme Court as a fresh effort

by advocates of centralized government to chip away more state authority.

Daniel said the suit, filed by Atty. Gen. Herbert Brownell before he resigned, seeks not only to repudiate treaties by which Texas entered the Union but kill legislative intent of Congress.

"This is a most peculiar situation in the history of American government," Daniel said.



THIS IS a model of Skelly's new Tulsa home. Skelly is one of three . . .

Oil Firms Planning Buildings

CONSTRUCTION PLANS for new office buildings at Tulsa and Findlay, Ohio, to house three expanding oil companies, were announced last week.

At Tulsa, Skelly Oil Co. will erect a 15-story structure, and Amerada Petroleum Corp. will have a new 9-story building. At Findlay, Ohio Oil Co. has started excavation and foundation work on a 9-story building.

The Skelly building will be home to 1,100 employes, 600 of whom now work in the company's marketing headquarters at Kansas City and the remainder in the Tulsa office. The company will vacate its present Tulsa downtown office structure.

Construction will start in 4 to 6 months and be completed in late 1959 or early 1960. The cost is "in the $10-million class." The building, with roof space for a heliport, will cover three-fourths of a block and have 2 additional stories underground.

The first two above-ground stories will contain a parking garage covering the entire 276-ft. by 375-ft. site, an auditorium, dining and lounge facilities, and office space. The 13-story office tower will have a gross area of 425,000 sq. ft.

Skelly President J. S. Freeman said the building will fulfill a "dream" of the late company founder and president, W. G. Skelly. It will care for the company's expansion needs for an estimated 10 years. Foundations will be sufficient for adding wings to the office tower.

Amerada and Ohio . . . Amerada's building, 140 ft. by 150 ft., will be started within a month and require 15 months to complete.

The building will be a solid structure without courts or insets. Exterior will be of buff stone and aluminum window panels. The foundation will support two more floors later if needed. Amerada will be the sole occupant and will move out of rented quarters in downtown Tulsa.

The Ohio building at Findlay will occupy a quarter-block and contain 270,000 sq. ft. of space. Construction will be finished by early 1960.

The building will more than double present office space of Ohio's general offices. An addition recently was completed on another Ohio building.

——*Industry* briefs

Standard Oil Co. (Ohio) has been barred from using the trademark, Sohio, in marketing operations in states where Standard Oil Co. (Indiana) operates. An injunction, issued by a Cheyenne, Wyo., District Court in July, 1956, has been upheld by the Tenth Circuit Court of Appeals at Denver. The injunction held that the name Sohio confused purchasers as to product origin. Ohio Standard can still use the name in other than marketing operations.

Louisiana's oil-production allowable for February has been set at 803,855 bbl. daily. It is unchanged from the January level except for 4,198 bbl. daily to take care of new production.

A subsidiary, Canadian Pacific Oil & Gas, Ltd., has been formed by Canadian Pacific Railway Co. for development of company mineral resources. Canadian Pacific holds about 11,300,000 acres of mineral lands in the Prairie Provinces. Petroleum engineering consultants were hired last May to evaluate the railway's acreage. The new subsidiary will have authority to engage in all phases of discovery, development and sale of oil and gas.

Tennessee Gas Transmission Co. is increasing its oil production about 1,000 bbl. daily through purchase of properties in East Texas and the Texas Gulf Coast. TGT has contracted to buy the oil and gas interests of C. N. Housh and the estate of his late brother, L. G. Housh.

The deal involves working interest in 52 leases and 113 wells. Reserves are estimated at about 2,000,000 bbl. of oil and 6 billion cubic feet of gas. Net gas production is about 2,500,000 cu. ft. daily. Most of the properties are in Austin, Harris, Colorado, Montgomery, Liberty, Tyler, and Titus counties.

February allowables for wells in northwestern New Mexico have been set at an average of 13 bbl. per day. This is 2 bbl. per day higher than the January allowable, out much lower than the 28-bbl. quota which was in effect until January 1. The New Mexico Oil Conservation Commission said the allowable is expected to remain low in March, but should increase sharply in April with completion of the Four Corners pipeline to the West Coast.

J. F. McADAMS (left) succeeds Frank Bateman as head of AOSC. Contractors reminded that . . .

Prospects Look Good Abroad

OILWELL SERVICE contractors may be missing a good bet by failing to extend their operations abroad.

That advice comes from W. Dow Hamm, general manager of exploration for Atlantic Refining Co., who says that U. S. oil companies operating abroad want more contractors to set up foreign offices.

Speaking at the second annual meeting of the young but fast-growing Association of Oilwell Servicing Contractors in Dallas last week, Hamm reminded the contractors that they are an integral part of the domestic industry. As such, they are missed by U. S. companies working in foreign areas.

But he warned the contractors not to expect to make a quick fortune abroad. He cautioned them against entering foreign operations without sizable capital backing or a definite work contract.

He pointed out that operations in foreign locations have hazards and disadvantages, such as language barriers, customs headaches, and personnel problems. But if properly prepared, a service contractor would more than likely find foreign operations rewarding.

Group expands . . . Registration at the convention reached 250 this year—more than double the attendance during the association's first annual meeting in Fort Worth last year.

Membership has also doubled in the past year, from 100 contractors a year ago to more than 200 in 10 chapters in Texas, New Mexico, Louisiana, Mississippi, and Arkansas.

During the coming months, the association will direct its efforts toward:

. . . Getting lower insurance rates by emphasizing safety and by working with state legislatures.

. . . Developing uniform accounting systems.

. . . Promoting higher operational standards.

. . . Hiking membership. The association has set its sights on expanding into Oklahoma next. It has had inquiries concerning possible organization of chapters in California, Illinois, Pennsylvania, New York, and other states.

Main accomplishments during the past year included passage by the Texas Legislature of a new highway weight law more favorable to service contractors and obtaining relief for contractors from a New Mexico law imposing a heavy tax on butane fuel.

Succeeding Frank Bateman of Hobbs, N. M., as president this year is J. F. McAdams, also of Hobbs. Other new officers include J. C. Williams, Jr., of Springhill, La., and Thomas E. Goebel of Spur Well Servicing Co., Houston, both vice presidents, and Jimmy Wilkins of Permian Servicing Co., Levelland, Tex., treasurer.

Kansas Law Killed

by Supreme Court. Price of gas can't be fixed by states

A FAST-MOVING Supreme Court last week held, in effect, that the states do not have the right to fix minimum prices for natural gas.

The court did not spell that out. But it reversed a Kansas Supreme Court decision that the state corporation commission had the right to put a floor of 11 cents per 1,000 cu. ft. under gas produced in Hugoton field.

No formal opinion accompanied the ruling. The court merely reversed the decision, citing previous cases including the original Phillips suit.

The action came less than a week after the court heard oral argument in the case, which originally was a private contest between Cities Service Gas Co. and the Kansas commission (OGJ, Jan. 20, p. 89).

It was the second time the high court had ruled out state price orders. Previously, it held against an Oklahoma order. The Oklahoma case involved gas sold at the pipeline end of a processing plant. The Kansas case covers gas sold at the wellhead.

There was additional importance in the Kansas case, however. For the first time in the history of gas regulation, the Federal Power Commission stepped into a private suit to make it a national issue.

As "friend of the court" the FPC filed a brief through the Justice Department in which it argued that the fixing of prices by a state was an invasion of its over-all authority.

The Kansas order, the court was told last month, "directly conflicts with the exclusive jurisdiction of the Federal Power Commission to regulate wholesales of natural gas producers to interstate pipeline companies."

"By requiring producers to charge a minimum rate in selling their gas to pipeline companies . . . the state order effectively undercuts the right of the power commission to regulate the maximum price for such sales," FPC argued (OGJ, Dec. 23, p. 28).

The Kansas decision also may have killed the chances of Saturn Oil Co. for getting a high court review of a decision affirming an FPC order requiring a certificate for sales of gas at the wellhead.

Saturn attorneys had hoped they would have their petition for review considered before the Kansas case was decided. They filed the petition shortly after that case was argued, contending they should be heard before final decision was reached.

Jersey May Juggle Lab Setup

CARTER OIL CO.'s research laboratory at Tulsa may be taken over by another member of the Standard Oil Co. (N. J.) family.

Much of Jersey's exploration and production research is conducted at the lab, which has been operated by Carter for 23 years. Officials would not say which Jersey company would operate the lab if a change is made.

Dr. Carl O. Tongberg, Carter vice president in charge of the research center, said only that such a move is "under consideration."

As headquarters for all oil-finding and producing research for Jersey producing subsidiaries, the 400-member staff works on problems from nearly every major oil-producing area in the world.

Two other Jersey affiliates, Humble Oil & Refining Co. and Imperial Oil, Ltd., maintain similar labs in Houston and Calgary. Some production research is also handled at Linden, N. J., by another Jersey subsidiary, Esso Research & Engineering Co. However, most of the research activity of Esso Research has to do with refining and product improvement.

Rapid growth . . . The Tulsa research center was founded in 1935 when Carter set up a geophysical lab in a few rooms in a warehouse at the company's old production camp in Tulsa.

Two years later, the lab was expanded to carry on production as well as geophysical work. In 1938, the staff began to take on research for other Jersey companies. The first modern lab building was completed in 1940. Since then four new wings have been added.

Research on the 25-acre site is divided into 10 sections: Recovery research and engineering, producing research and engineering, geophysical research and engineering, drilling research, geological research, geochemical research, and technical information. Chief of research is Dr. P. S. Williams, who has been with the center since shortly after its founding.

About half of the center's 400 employes are technically trained. Based on their highest attained degrees, about 43 per cent hold bachelor's degrees; 25 per cent master's degrees, and 32 per cent doctorates.

Higher Shale Depletion Rate

. . . recommended to House committee by former governor. NCA also pushes for higher allowance for coal industry.

A PROPOSAL calling for a 27½ per cent depletion allowance for oil shale and other natural materials used in production of synthetic oil or gas was recommended to the House ways and means committee last week.

The allowance would bring synthetic oil closer to competition with petroleum, and wouldn't cost the Treasury anything, the committee was told. On the contrary, former Gov. Edwin C. Johnson of Colorado said, it would create new state and federal revenues.

In November the Internal Revenue Service ruled that shale mined solely for its kerogen content is entitled to a 15 per cent depletion allowance (OGJ, Nov. 25, 1957, p. 64). The IRS ruling pointed out that oil shale does not contain oil as such, but contains kerogen, a material from which shale oil is derived.

Depletion allowances serve to protect consumers, Johnson declared. Without it, the price of gasoline would be 50 per cent higher, he said.

A staggering volume of oil is locked up in shale which has been found in Alaska and in at least half the states. The Government estimates the amount at over 1 trillion barrels of oil in Colorado alone. There are at least 50 billion barrels of recoverable fuel in Utah and another 5 billion barrels in Wyoming.

A number of companies already are actively developing extraction processes, Johnson said. Union Oil Co. of California has spent almost $8 million on two pilot plants in California and Colorado.

Johnson estimates that it will cost about $7,800 per barrel of daily capacity to build a complete shale-oil plant, including refining units. This would put a price tag of $156 million on a 20,000-bbl. plant and over $700 million on a 100,000-bbl. plant. A pipeline to the Pacific Coast would cost another $50 to $100 million.

Capital investment for a shale-oil industry with an output of 1 million barrels of oil daily would be in excess of $7 billion.

——*Pipeline* briefs

Cia. Shell de Venezuela has awarded Williams Brothers Sudamericana, Ltd., the contract to build a 34-mile, 16-in. pipeline to transport crude from Boscan to an $84-million terminal at Puerto Miranda on Lake Maracaibo. The pipeline will cost $8 million.

The viscosity of the heavy crude, which averages 10°-gravity, will require heating of the line to expedite movement. Two heating stations will be built at La Concepcion and Puerto Caballo. Shell plans to be moving more than 15,000 bbl. daily by April. The line will have normal capacity of 75,000 bbl. daily.

Northwestern Refinery Co. has connected its 12,000-bbl. refinery at St. Paul Park, Minn., with the Great Lakes Pipe Line System. The company will now be able to use the system to ship gasoline, home heating oils, and diesel oils. The company's marketing area will be expanded considerably.

Shamrock Oil & Cas Corp. plans to market refined products in the Mid-Continent area through the Great Lakes Pipe Line system. Shamrock's affiliate, Emerald Pipe Line Corp., has converted a 6-in. crude line to products from its McKee refinery in the Texas Panhandle to Turpin, Okla.

Emerald is extending this line to Liberal, Kans., some 20 miles to connect with Okan Pipeline Co., which runs from Liberal to Tulsa. Okan has laid a 4-mile, 6-in. spur to connect with Great Lakes at Enid. Emerald said a joint pipeline tariff covering through transportation from McKee to Enid and Tulsa would be filed with Okan, which now transports only natural gasoline, propane, and butane. This will be the first motor fuel to be shipped on Okan.

Also for Pipeliners . . .

IN THE NEWS: Pipeliners still optimistic about the future, contractors convention hears (p. 126) . . . R. P. Gregory elected by pipeline contractors (p. 128) . . . FPC grants first clear-cut rate increase since Memphis decision (p. 133) . . . U. S. Supreme Court kills Kansas law fixing minimum gas prices at the wellhead (p. 136).

PLUS THESE TECHNICAL REPORTS: Natural-gas production gains 5.5 per cent (p. 158) . . . Pipeline construction has biggest year in 1957 (p. 182) . . . Automatic pipeline moves nearer (p. 184).

Bigger Flow Asked

. . . for West Texas' Headlee field. Two firms not in unit say 6-day schedule isn't necessary to prevent loss of oil.

THE SIMMERING QUESTION of how many days big Headlee field should be allowed to produce is before the Texas Railroad Commission again.

The commission's problem: Whether to restore the reservoir to the state-wide producing pattern as requested last week by Carlton Beal & Associates and U. S. Smelting, Refining & Mining Co.

Headlee has been operating only 6 days a month since November 1, 1956, a rate ranging from one-third to one-half the state-wide allowable.

The Headlee allowable was cut to 6 days on an unusual application of most of the operators in the field. Their reason: A threatened loss of 50,000,000 bbl. of oil if bottom-hole pressure of the Devonian zone should fall below the saturation level before pressure maintenance could be started.

Last October the commission approved an 8,400-acre unit for the field and endorsed operators' plans for a high-pressure gas drive (OGJ, Oct. 14, 1957, p. 116). Limited gas injection through three input wells began December 1.

Beal and U. S. Smelting are the only working or royalty interest holders in the field that are not members of the unit. Both opposed removing the field from the state-wide status and fought the gas-injection plan.

Allowable question . . . A spokesman for U. S. Smelting at a January 7 hearing said the commission originally approved the 6-day allowable for a 6-month period beginning November 1, 1956.

It continued this rate for another 6 months in May last year. When the commission failed to call a hearing at the end of the second 6 months, the spokesman said, the applicants asked for the one held January 7.

Since unit operation and gas injection have started, he said, Beal and U. S. Smelting see no reason for retaining the field allowable at a hardship level.

Lynn E. Foster, Beal engineer, said Beal's wells are producing at pressures well above the saturation level.

Unit objects . . . Texas Gulf Producing Co., unit operator, told the commission any hike in the field production rate now would be disastrous.

Robert H. Parks, Texas Gulf engineer, said pressure and GOR data indicate that wells in the Carlton Beal area of the field already are below the saturation pressure. This, he said, means that avoidable waste is taking place.

If the field allowable is raised now, Parks said, several more areas of the field would suffer pressure declines below the saturation point before gas injection could become effective.

The pressure-maintenance program, he said, has just begun and has a long way yet to go. The unit currently is injecting only 6,000,000 cu. ft. of gas daily through three wells. By May 1, it plans to add four more inputs and hike injection to 14,000,000 cu. ft. daily.

Parks said the unit plans to develop its program on a 9-spot, 320-acre injection pattern and eventually to inject as much fluid as the field produces.

Until this stage is reached, however, pressure will continue to decline, Parks said.

He told the commission the unit will expand to cover 10,649 acres by adding another 2,258 acres effective February 1.

The unit, Parks said, plans eventually to expand further to cover the entire 12,840-acre field.

Bright Spot in Canadian Gloom

. . . seen by industry leaders. Imperial and BA plan big investment programs, expect domestic market to increase.

CANADA'S OIL INDUSTRY, buffeted by loss of export markets in 1957, will have plenty of investment capital in 1958. Leaders hope to see production climbing again by the last half of the year.

Imperial Oil, Ltd., expects to spend $133 million during the year to bring its total investment in Canada to $1 billion since the Leduc discovery in 1947.

British American Oil Co., Ltd., plans a $147 million spending program for 1958.

During 1957 the Canadian oil industry suffered because depressed tanker rates, which followed the Suez crisis, brought stiffer competition from overseas oil for the U. S. West Coast market.

Also the voluntary U. S. import program tended to cut the volume of crude which can cross the border.

Despite these setbacks industry leaders in Canada foresee an expanded market—principally within Canada itself.

BA's President M. S. Beringer says the demand for petroleum products rose about 7 per cent in 1957 and, after a "moderate leveling-off" in the next few months, the industry should show a greater gain for the year than it did last year.

Beringer expects crude production for western Canada to average 550,000 bbl. daily and exports to be around 140,000 to 150,000 bbl. daily. The region's producing potential, he says, is about 900,000 bbl. daily and will increase to about 1,000,000 by the close of the year.

Although drilling and exploration were down slightly in 1957, Beringer pointed to a record year in construction of pipelines and gas-processing plants. The Interprovincial crude line was extended from Sarnia to Clarkson and Port Credit, and some 4,300 miles of pipeline was laid for gas gathering and transmission.

Imperial's President J. R. White said that nearly one-half of the $133 million his company will spend in 1958 will go for exploration and development in all Canadian provinces. The rest will go into refinery construction, petrochemical development at Sarnia, and marketing improvements.

During its billion-dollar spending era since 1947, Imperial has invested at a rate roughly double its net earnings, White said. Refining capacity has increased from 138,000 bbl. daily in 1947 to 300,350 bbl. daily today.

Funds budgeted by Imperial this year for investment are generally in line with average spending in recent years, he said.

A less optimistic outlook for 1958 has been voiced by John W. Proctor, general manager of the Canadian Petroleum Association. Proctor fears that if Canadian operators fail to find an outlet for their excess oil and gas, there may be serious unemployment.

Some 900 gas wells are idle, and 100 rigs are shut down.

Wilmington Floods Approved

CALIFORNIA'S huge Wilmington field suddenly found itself last week with two full fledged water-flood projects on its hands.

These developments climaxed more than 2 years of hearings, expert studies, dire predictions, and veiled threats.

Work actually has started on one. It's a 20,000-bbl.-daily flood of the lower Terminal zone of fault Block II-A. Joint operators are Union Pacific Railroad and General Petroleum Corp.

The other — a 180,000-bbl.-daily flood of Long Beach owned tidelands portions of the field—has received city approval to start. This project actually involves increasing a present 20,000-bbl. pilot flood to include a larger area and more zones.

The big flood calls for the Long Beach Oil Development Co., operator on Long Beach's tidelands within the harbor area, to use a minimum of 25 injection wells. The 180,000-bbl. figure is also a minimum amount. Provisions have been written in the contract for increasing it if city engineers feel such a move will help maintain or increase pressures.

As now planned, LBOD will start the flood on a peripheral design basis. But operator is not restricted to that technique by contract and will go to a pattern flood if early studies indicate that method would yield best results.

Good water handy . . . One interesting feature of the project is use of water-source wells.

These are drilled to about 300 ft. where naturally filtered sea water is found. The water is free of both bacteria and oxygen. Additional treating likely will not be required before injection. Several of these water wells in other parts of the field are already being used in pilot floods by other companies. One being used by Richfield Oil Corp. on its pilot flood of the lower Terminal of Block 6 has a potential of 45,000 bbl. daily. Richfield, however, is withdrawing only 3,000 bbl. daily now.

Cost of the big flood will depend on how much work will be required in altering existing wells. If extensive alterations are needed, the cost could hit $50 million, including operating costs, according to the harbor department.

The 25 injection wells, plus an undetermined number of water wells and other injection facilities, will run about $5 million.

LBOD's timetable indicates the flood should reach the 180,000-bbl. mark some time in 1960.

The harbor department indicated it also probably will ask Richfield to boost its 3,000-bbl. pilot flood to 15,000 bbl. daily.

Final approval . . . The LBOD flood won final approval largely on the recommendation of the city's two consultants—W. L. Horner of Core Labs, and G. E. Woodward of DeGolyer & MacNaughton.

Horner originally had advised the city against the flood until it received assurance the project would fit in with the 1,000,000-bbl.-daily flood planned for the entire field.

When it originally was proposed, the 180,000-bbl. flood was labeled strictly a secondary-recovery project. Meanwhile, the subsidence panic set in. Rather than secondary recovery, floods for halting subsidence became the chief concern of Long Beach.

When LBOD recently asked approval of its plans, it had to prove them sound for subsidence abatement as well as secondary recovery. Then before final approval came, the company was forced to change the contract. It agreed to expand the flood if necessary, to produce and treat the water needed in any expansion, and to cooperate with the city on other projects.

One flood starts . . . Union Pacific and General Petroleum last week spudded in the first of four injection wells planned for its 20,000-bbl.-daily flood in the onshore part of the harbor area in Wilmington field.

The actual property involved is owned by the railroad and the Ford Motor Co. General Petroleum operates Ford's property.

Both the railroad and General Petroleum will operate its own facilities. The two companies have a unit agreement on both the upper and lower Terminal zones of the fault block. There are 108 wells producing 5,500 bbl. daily from both zones.

The flood cooperative calls for Union Pacific to provide sand-filtered water using water-source wells similar to those planned for the 180,000-bbl. flood. Initial injection will be at 1,200 psi.

Clark Modernizes Illinois Refinery

CONSTRUCTION work on a new fluid catalytic cracker at Clark Oil & Refining Corp.'s Blue Island refinery near Chicago will be completed this spring.

The 12,500-bbl. daily unit is one of the largest of its kind in the Chicago area. Procon Inc. is handling construction. Universal Oil Products Co. designed, engineered, and licensed the unit.

The photograph above shows construction of one section of the catalytic-cracking unit.

Besides the 32,000-bbl. Blue Island plant, Clark has a 7,000-bbl. refinery at Marrero, La. The firm is an agressive marketer in the Chicago area.

Shell Claims Crude

. . . bound for California refinery from Sumatra. Company regards itself the rightful owner of producing area.

NORTHERN SUMATRA crude soon may be moving through a Long Beach, Calif., refinery, but a dispute over ownership of the crude appears to be shaping up.

Ralph Edgington, president of Edgington Oil Refineries, Inc., has made a deal with Indonesia for the crude, but the Royal Dutch-Shell group says the oil belongs to it.

Edgington confirmed his contract with Indonesia early this month and said he plans to import the high-gravity crude for his two refineries (OGJ, Jan. 6, p. 84).

This brought an almost gentle reminder from Shell that it still regards itself as the owner of the North Sumatra oil fields. It also aroused speculation that Shell may press its claim to the fields which it has not operated for more than 15 years.

"Bataafsche Petroleum Mij. has owned the concessions in North Sumatra, where the producing fields are, since before the war," a Royal Dutch-Shell spokesman said last week.

"BPM has not relinquished its rights to these concessions and still considers itself the rightful owner of the concessions and all the oil produced from them."

The Shell claim apparently came as no surprise to Edgington.

"We are dealing directly with the Indonesian Government," Edgington commented. "This is a sovereign government. Therefore, we don't feel we should question the integrity of the government which has executed the contract with us."

The background . . . The Shell company operating in North Sumatra was producing about 22,000 bbl. daily from 10 fields north of Medan before the Japanese invaded Indonesia. It also operated a crude still at Pangkalan Brandan with a daily throughput of about 18,000 bbl.

When the Japanese were forced out of Sumatra by Allied forces, the local government took over the fields and the refinery. The fields and refineries in other parts of Indonesia were later returned to Shell and the two American companies operating there. But, the Indonesian Government never gave the North Sumatra properties back to Shell.

A small amount of crude was produced and processed in the badly rundown refinery. Most of it went to supply motor fuel for local military vehicles.

More than a year ago, the Central Indonesian Government at Djakarta finally said flatly it would not return the properties to Shell (OGJ, Nov. 5, 1956, p. 83). Months later it drew up a set of petroleum regulations for future development of the fields. Later the army took over the operation.

Early this month the central government set up a general oil holding company with a board of directors composed of army officers. An operating affiliate of this holding company called Tambang Minjak Nasional will operate the North Sumatra fie'ds.

BALTIC REFINERY bows to Canada's "far north" claim, but . . .

Finns Proud of Modern Plant

THE HARDY FINNS, happy about the fine performance of their first refinery, had to backtrack on their claim to the northernmost refinery in the world (OGJ, Dec. 23, p. 53).

The claim was immediately challenged by Canadians, who say that Canada holds the title to the northernmost refinery. A group of geographers dropped more pressing matters to prove their point.

The conclusion: The new Finnish refinery is the second northernmost refinery in the world. The title goes to the Imperial Oil, Ltd., plant at Norman Wells in Canada's Northwest Territories. This 1,300-bbl. plant is just above the sixty-fifth parallel.

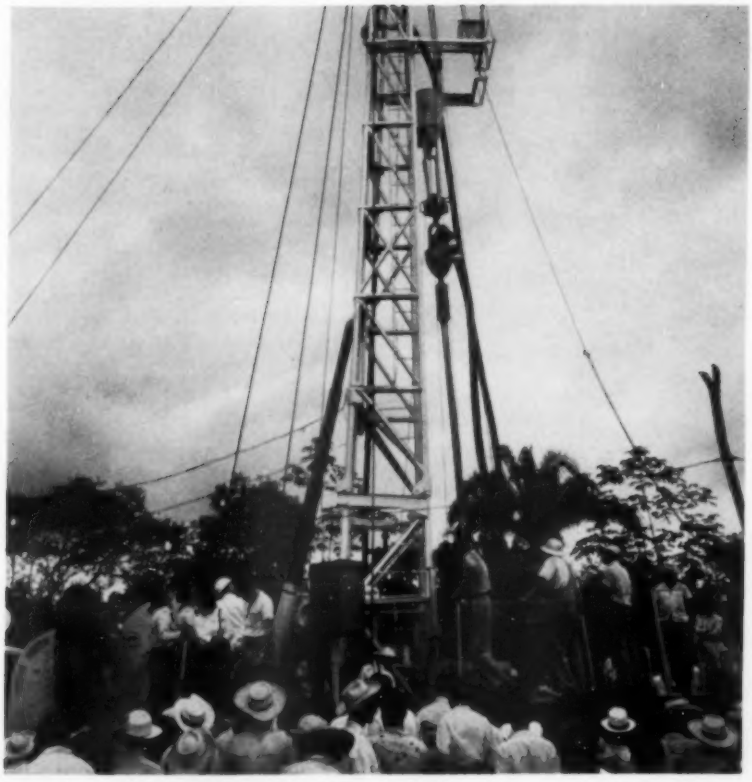
The new Finnish plant, which was put on stream last summer by the government-owned company Neste Oy, is located at Naantali near the southwestern part of Turku. This is just north of the sixtieth parallel.

Finland is not likely to become disturbed over the Norman Wells challenge. The Finnish plant is one of the few refineries in the world—and the first complete refinery in Europe—to have a fully electronic instrument control system.

Furthermore, the plant is running as smoothly as a Swiss watch. It is operating at 115 per cent capacity on a mixture of crudes from the Middle East and Russia. The plant is designed to handle 18,500 bbl. daily of mixed crudes, or 19,200 bbl. of Russian crude alone.

The plant took less than 2 years to complete; and 6 weeks after the startup, it was producing a full line of gasoline, fuel oil, LPG, and asphalt products.

Special equipment includes a Thermofor catalytic cracking unit, a Catformer, catalytic polymerization unit, and an asphalt vacuum and oxidation unit. Lummus Co. handled engineering and supervised construction.



IT'S A BIG EVENT when this wildcat is spudded and . . .

Guatemalan Oil Search Starts

GUATEMALA'S first wildcat was spudded recently by Coastal Plains Oil Co.

The test, designated the 1 Carlos Castillo Armas, is being drilled on a 48,000-acre concession acquired by Coastal Plains through merger with Sloane Exploration Co. (OGJ, Oct. 21, 1957, p. 89).

Location is about 27 miles inland from Puerto Barrios on the Caribbean coast, near the village of Bananera. The test is projected to 5,500 ft.

A group of about 50 persons, including many top government officials, gathered at the rig for the spudding-in ceremony. The event was one of national significance for the oil-hungry Central American country. The well was spudded January 18.

According to Guatemalan reports, geologists of 39 companies are exploring northern Guatemala. About $15,000,000 is expected to be spent in the search for oil in Guatemala this year.

Guatemala has granted concessions on more than 10 million acres since a new petroleum law was passed in 1955. The most recent is a 12,000-acre grant made to Antonio Molina. The block lies in the Gulf of Honduras.

The Coastal Plains test was named in memory of Guatemala's late president, Castillo Armas, under whose administration large sections of the country were opened to oil exploration by foreign companies.

A. F. Lavender is president of Coastal Plains. The company maintains operations headquarters in Houston. Storey Sloane, former head of Sloane Exploration, was named vice president of the reorganized company.

Gulf Plans African Wildcat

GULF OIL Corp. has suspended drilling operations in one concession on the west coast of Africa, but will soon start drilling in another.

Ghana Gulf Oil Co. has shut down the rig drilling on a 200-sq. mile tract of onshore and coastal waters in Ghana. The company expects to resume drilling after information obtained so far is evaluated. The concession is in a Cretaceous-Eocene embayment.

Cabinda Gulf Oil Co. will pick up where the Ghana operation leaves off when the first wildcat starts soon in Cabinda. The area lies between Belgian Congo and French Equatorial Africa.

Russo-Syrian Deal

won't affect exploration by German, American firms.

A SKELETON AGREEMENT for Russian exploration in Syria has not interfered with the activities of a West German company drilling in the country.

A Deutsche Erdoel, A. G. subsidiary, Ste. des Petroles Concordia, is drilling ahead at 7,500 ft. at El Bouab 1. The wildcat is the first on the company's concession in northeastern Syria.

The company says that Syrian officials have assured it that its concession rights will be safe if an exploration deal with the Soviets is firmed up.

Under the terms of a recent economic-aid agreement, Syria has an option to obtain Russian exploration help in the same general area where Deutsche Erdoel has its concession. An American group consisting of J. W. MenHall, Atlantic Refining Co., and Portsmouth Steel Corp. has acreage in the same general area.

Russia has offered to carry out gravimetric and seismic surveys in an area up to 20,000 sq. miles. It also is willing to supply equipment and drill 18 wildcats of 5,000 ft. to 10,000 ft. in depth. Syria would pay for the program with a long-term loan at 2½ per cent interest.

The MenHall-Atlantic-Portsmouth group is drilling near the Iraq border where it has made a discovery reported to be in the 1,000-bbl. daily class.

Hunt Finds Pakistani Gas

Hunt International Oil Co. may have a gas discovery north of Karachi in West Pakistan.

The company is flaring gas from a formation topped at 10,300 ft. in a well drilled in the Dadu district of the Indus Valley. A spokesman in Karachi indicated that chances were good for reserves on a commercial scale.

The well will be deepened to a projected depth of 13,000 ft. in search of oil. Two oil shows were encountered farther up the hole.

Venezuela Has Best Year

. . . in production history. 1957 gain in output tops all other countries. Drilling activity climbs 22 per cent.

NET CRUDE PRODUCTION PLUS ROYALTY PURCHASES
(Barrels daily)

	1957*	1956	Per cent change
Creole	1,148,500	1,080,061	+ 6.3
Shell	976,600	801,622	+21.8
Mene Grande	200,000	181,013	+10.5
Socony	114,100	95,575	+19.4
International	100,000	90,507	+10.5
Richmond	92,600	61,742	+50.0
Texas	44,600	46,824	— 5.0
Sinclair	28,300	29,066	— 2.7
SAP Las Mercedes	27,900	24,268	+15.0
Atlantic	22,300	15,467	+44.2
Phillips	15,600	12,116	+28.8
Others	15,200	19,672	—29.4
TOTAL	**2,785,700**	**2,457,933**	**+13.3**

*Partly estimated.

LATE RETURNS from companies operating in Venezuela are making clear just how good a crude producing year the country enjoyed in 1957.

Despite a year-end slump, Venezuela had its best year in history. In competition for world markets, it became more entrenched than ever before as the second-ranking crude producing country.

The figures speak for themselves:

. . . **The 2,785,700-bbl. daily** average was a gain of 13.3 per cent over 1956. The increase of nearly one-third of a million barrels daily led all other countries in the addition of new production.

. . . **Output equaled 39 per cent** of the level of United States production. It accounted for 18 per cent of all crude produced in the free world.

Most companies gain . . . Cia. Shell de Venezuela made the most progress with an increase of nearly 175,000 bbl. daily. Creole Petroleum Corp. added 68,500 bbl. daily. Mene Grande Oil Co. was up 19,000 bbl.

Richmond Exploration Co., a subsidiary of Standard Oil Co. of California, increased production 50 per cent by stepping up the flow of heavy Boscan crude. Venezuelan Atlantic Refining Co. had a 44.2 per cent increase due to big gains in Oritupano and Aguasay fields, along with moderate increases in Tacat and in the Adjuntas block.

The Sinclair Oil Corp. subsidiary opened Barinas and Aguasay production late in the year. But these fields came too late to offset declines in Santa Barbara, Muri, Travieso, and Guere fields. The net decline was 2.7 per cent.

Drilling rises . . . A total of 1,860 wells were drilled during the year. Of these, 1,675 were development wells. There were 185 wildcats. This was an over-all gain of 22 per cent over 1956.

An average of 115 rigs were in operation, compared with 104 the preceding year. This did not include outfits on workover and service.

Crude production rose from 2,792,000 bbl. daily at the start of the year to a peak of 2,968,600 bbl. daily in June. It tapered off to about 2,500,000 bbl. daily at the end of the year.

This swing in production was reflected in drilling programs. Fifteen per cent of the rotaries were on wildcats early in the year. At the end of the year 28 per cent of the outfits were wildcatting. Companies shifted from development drilling as demand slackened, and in order to evaluate new concessions.

Oil Still Flowing in Venezuela

IF VENEZUELA'S oil industry even faltered during last week's revolt, it was not perceptible to the eye.

Gen. Marcos Perez Jimenez, the Venezuelan strong man, fled to a sanctuary in the Dominican Republic during bloody street fighting in Caracas. A five-man military junta, supported by civilian revolutionary forces, took over the government. The country's oil kept flowing.

Not even the general strike which preceded the hasty departure of Jimenez appeared to have more than a minor effect on the oil industry. The companies which run the multibillion-dollar industry said last week their producing operations were normal.

There was extensive absenteeism in the work forces of the country's biggest refineries, but not enough to force a shutdown.

The 40,000 Americans in the country, most of them oil workers, discreetly heeded government warnings to stay indoors and out of the way of the rioting populace. There were no reports of any injuries to Americans or damage to American property. This is being widely attributed to the public popularity of Americans in general and oil people in particular.

After the rotund little dictator bowed to the military-civilian demand that he step out, the government radio urged oil workers to remain calm and stay on the job.

Even in a revolt, Venezuelans are conscious of the money oil puts in the pockets of Venezuelan labor and the $1.5 million a day in royalties which have made the country the richest in Latin America.

9-Year-Old Well to Be Tested

A Royal Dutch-Shell company operating in British Borneo will test a high-pressure zone encountered in a well drilled 9 years ago.

Sarawak Oilfields, Ltd., plans to test and complete Miri 604, the last well drilled in the 47-year-old field. The well was suspended in 1949 at 8,911 ft. "pending a suitable opportunity to investigate a high-pressure zone encountered there."

Two new wells will be drilled in the same area early this year. The first will start as soon as jungle is cleared and a road built to location.

The high-pressure formation was found under producing horizons, which range from 300 ft. to 3,050 ft. in depth. Miri output has declined to 1,270 bbl. daily. The field is 30 miles east of the 115,000-bbl. daily Seria field, operated by Brunei Shell Petroleum Co., Ltd.

India Signs Oil-Development Pact

A NEW COMPANY, Oil India Private, Ltd., has been organized to develop oil fields in Upper Assam and build pipelines linking the fields to refineries being planned in India.

The oil-development company was formed following the signing in New Delhi in midmonth of an agreement between the Government of India and Burmah Oil Co., Ltd., and its subsidiary, Assam Oil Co., Ltd.

Oil India Private will develop newly discovered Nahorkatiya field in Upper Assam and build pipeline facilities from the wells to refineries under study in Assam and at Barauni in Bihar (OGJ, Dec. 16, p. 81).

Photograph above shows actual signing of the agreement covering development of the field, pipelines, and refineries. Documents are being signed by R. P. Smith, managing director of Burmah Oil, and Sir K. K. Sahni, joint secretary of the ministry of steel, mines, and fuel.

Also present for the ceremony were Sir N. R. Pillai, secretary general, external affairs ministry; Sir S. S. Khera, secretary of the ministry; Sir S. Ratnam, secretary, finance ministry; W. A. W. Clark, acting high commissioner for the United Kingdom; G. J. MacMahon, United Kingdom senior trade commissioner; and W. P. G. Maclachlan, general manager of the Assam Oil Co., Ltd., Digboi.

Trinidad Blooper Cleared Up

JUST A MIXUP in wells was the explanation given by Trinidad's chief minister in a public apology to Dominion Oil Co.

The unprecedented apology came after this sequence of events:

The new minister, Dr. Eric Williams, is against the depletion allowance the previous administration allowed oil companies for offshore drilling. Dr. Williams told his legislative council such an incentive for offshore drilling isn't necessary. To prove his point, he said three wells at Soldado, Trinidad's only offshore field, are producing 2,000 bbl. daily.

He added that Dominion's Couva Marine 1 tested 295 bbl. an hour. His statement got wide circulation in newspapers in Trinidad and in Great Britain. Dominion's parent company, Standard Oil Co. of California, called the Williams report "unfounded" and said there's no discovery (OGJ, Jan. 20, p. 104).

Then the minister issued a public apology to Dominion and said he was sorry if he had caused any embarrassment. Couva Marine 1, being drilled from a floating barge, went to 7,070 ft. but lost the mandril in the hole at 5,500 ft. during a round trip. The hole was sidetracked and last week was drilling below 5,863 ft. in the sidetracked hole. Socal says no significant oil or gas shows have yet been found.

Dr. Williams explained he read about the well in a field scouting report and got his reports mixed. The well with the 295-bbl. an hour test was in Venezuela.

Activity in Libya

picks up. Two new firms moving into African area.

LIBYA is taking on the look of an oil province.

Two new companies are joining the three who already have drilling operations under way in the North African region.

One of the three already on the scene, Esso Standard (Libya), Inc., meanwhile, is testing a well that may be a major discovery (OGJ, Jan. 20, p. 100).

The newcomers are D'Arcy Exploration Co. (Africa), Ltd., wholly owned by British Petroleum Co., and Oasis Oil Co. of Libya, wholly owned subsidiary of Ohio Oil Co.

D'Arcy was drilling below 415 ft. last week on its first Libyan test. D'Arcy spudded Castel Benite 1 about 30 miles south of Tripoli with a light rig shipped to Africa from the United Kingdom.

Oasis plans to spud its first Libyan test within 90 days. The first well, Bahi 1, will be located about 275 miles south of the Gulf of Sirte. The test may go to 15,000 ft.

Rig for the test was shipped last week from Houston. It will be operated by International Drilling Co., N.V.

Another 125 miles to the south, Socony Mobil is drilling below 5,500 ft. in its El Qatar, the company's first deep test in Libya.

Libyan American Oil Co. (Texas Gulf Producing) was the first to drill in Libya. The company is now drilling its fifth well in northern Cyrenaica. The first four tests were dusters.

Petrosur Buys Hydroil

PETROSUR OIL CORP., Inc., an international firm backed by Swiss banking interests, announced it has acquired Hydroil, Inc., a Houston oil-producing firm.

John W. Flude, Houston geophysicist, has been elected president of the expanded firm.

Hydroil has an estimated 1,000,000 bbl. of oil reserves in Coleman County, West Texas, a large lease in Karnes County, South Texas, and an overriding royalty on some 5,000,000 acres in Panama.

Petrosur has exploration rights in Panama, Bolivia, Cuba, and Venezuela.

EUROPEAN PLANS are being mapped by Joseph L. Hargrove, left, new foreign operations coordinator, and President H. L. Rowley, after . . .

Rimrock Enters French Play

. . . by buying Swiss firm with interest in big Acquitaine concession. Shreveport firm also plans other ventures.

RIMROCK TIDELANDS, Inc., Shreveport-based drilling contractor and independent producing company, has expanded into foreign oil operations.

H. L. Rowley, president, announced that the firm has purchased Mofag Oil Exploration Co., Inc. A Swiss firm, Mofag owns exploration concessions in Switzerland and France.

Rowley also announced appointment of Joseph L. Hargrove, Shreveport, as assistant to the president and coordinator of foreign operations.

The announcement pointed out that Mofag holds two Swiss concessions plus one-third interest in a 500,000-acre concession in the Aquitaine basin, French oil province. Geological work has been completed, and drilling operations are planned to start this spring on the Aquitaine concessions, Rowley said.

Rimrock Tidelands or its affiliates will be operator and furnish technical personnel and equipment for the French drilling program this year, Rowley said.

Mofag, a 2½-year-old Zurich-based company, also recently drilled five wildcats in Italy.

Rowley has been elected a director of the Swiss company. Other directors, all Swiss nationals, include Dr. Paul Gmur, president, who will retain offices in Zurich; E. L. Keller, H. R. Schwarzenbach, and Robert Gugelmann.

Eye on other areas . . . Rimrock Tidelands officials indicated further expansion into foreign fields is anticipated.

Rowley recently announced that the company had agreed to acquire controlling interest in Societa Olii Minerali, a Sicilian corporation which has been granted exploration rights on more than 46,000 acres along the northern coast of Sicily.

Rimrock Tidelands and affiliated companies are actively pursuing the search for additional concessions.

Controlling interest in Rimrock Tidelands is held by Husky Oil Co. Husky acquired 54 per cent interest through a merger last year between Rimrock and Trans-Tex Drilling Co., a Husky subsidiary.

New foreign chief . . . Heading up Rimrock Tidelands' foreign operations will be Joseph L. Hargrove, Shreveport.

Hargrove has been managing partner of Hargrove Oil & Gas Co. in Shreveport for the past 6 years. He also has been managing director of South Pacific Pty., Ltd., an Australian company.

——— *World* briefs

National Iranian Oil Co. expects to drill nine wildcats in the Qum area this year. Seacat Drilling Co. of Iran, S.A., owned by Texas and Middle East interests, has two rigs en route to the area from Houston (OGJ, Jan. 13, p. 67).

Shell Pernis Chemische Fabrieken N.V. will build a synthetic-rubber plant with a minimum annual output of 50,000 tons near the 300,000-bbl. Pernis refinery near Rotterdam. The plant will be the latest addition to a growing petrochemical center Royal Dutch-Shell is building in the Netherlands.

The first joint British-French marine drilling operation in the southern Persian Gulf got under way last week. Abu Dhabi Marine Areas, Ltd., spudded its first well 20 miles off Das Island from a new DeLong drilling barge built in Germany. British Petroleum Co. has a two-thirds interest in the venture and Cie. Francaise des Petroles owns the other one-third (OGJ, Jan. 13, p. 71).

Gewerkschaft Brigitta and Mobil Oil A.G. have brought in Varel 4, south of Wilhelmshaven, with a flow of 120 bbl. daily through a ⅛-in. choke. The 26°-gravity crude came from a 67-ft. section topped at 5,071 ft.

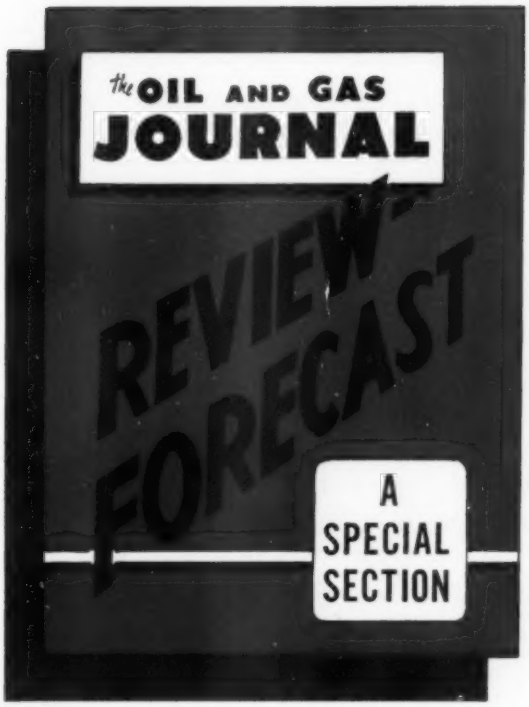
Signal Oil & Gas has changed the name of Signal Exploration Co. in Venezuela. The new title is Signal Oil & Gas of Venezuela.

Sta. Mediterranean Raffineria Siciliana Petroli, of Palermo, plans to build a refinery at Milazzo, Sicily. It will increase its capitalization to $3,200,000 for the project.

Sui Gas Transmission Co. is detouring its Sui-Multan gas pipeline for 93 miles rather than risk a hazardous crossing of the Indus River in West Pakistan. The rerouting will extend the length of the 16-in. line from 217 to 310 miles.

The company at first planned to cross the Indus at Guddu. But after taking a second look, it decided not to take the chance. In the rainy season, the river widens to 7 miles at Guddu and has a 10 m.p.h. current.

Israel Continental Oil Co. has found an oil show at 2,550 ft. in Deborah 1, west of Mount Tabor. The show is the first encountered in northern Israel.



Here's a capsule summary—

DRILLING . .

PLANS FOR 1958 show a gain in wildcatting and a reduction in development drilling. Total drilling will be down.

WILDCATS will be up 1.4 per cent to 11,908.

FIELD WELLS will decrease 4.4 per cent to 40,226.

FOOTAGE will drop 2.9 per cent to 215,445,000 ft.

WILDCAT RATIO will be 22.84 per cent in 1958.

TOTAL COMPLETIONS for 1957 took the biggest drop since the wartime reduction in 1942. Final totals for 1957 were:

WILDCATS, down 9.9 per cent to 11,739.

FIELD WELLS, down 6.7 per cent to 42,009.

TOTAL WELLS, down 7.4 per cent to 53,838.

TOTAL FOOTAGE, down 5.1 per cent to 221,-900,539.

PRODUCTION-DEPTH records were broken in four areas in 1957. Drillers set new total-depth records in nine areas. National depth records were unchanged.

Here are a few of the basins and areas containing exploration targets for 1958: Paradox, Williston, Green River, Powder River, Uinta, Piceance, Anadarko, Las Animas arch, Palo Duro, McAlester, Delaware, and Val Verde.

PRODUCTION . . .

CRUDE OUTPUT for 1957 showed very little increase over 1956. Total volume of crude produced was less than in 1956, but the daily average for the year was up slightly. The year 1956, being leap year, had an extra producing day.

PRODUCTION PATTERN for the year was abnormal. Because of export demands, crude production reached an all-time high in March but dropped almost 860,000 bbl. daily by October.

NEW PRODUCTION RECORDS were set by seven states in 1957. Two states, Louisiana and New Mexico, reported increases larger than the national average.

NATURAL-GAS production gained 5.5 per cent in 1957. Marketed production for the year is estimated at 10,638,600,000 M.c.f.

GAS RESERVES increased 10.5 trillion cubic feet in 1957. New gas credited to the year, including discoveries, extensions, and revisions, amounted to more than 21 trillion cubic feet.

GAS-LIQUIDS reserves gained 267,540,000 bbl. in 1957 to raise the year-end total to 6.17 billion barrels.

CRUDE RESERVES topped 33 billion barrels for the first time in 1957. Net additions for the year amounted to 857 million barrels.

PROCESSING-MARKETS . . .

REFINERY RUNS averaged 7,919,000 bbl. daily during 1957, down 17,000 bbl. daily from 1956. A gain of only 85,000 bbl. daily will be needed to meet product demand in 1958.

REFINERY YIELDS shifted slightly in 1957. Refiners made more gasoline and distillate but less kerosine and residual from a barrel of crude. Percentage yield of distillate was at an all-time high. Low points were recorded for kerosine and residual.

REFINERY REALIZATION increased in January last year, based on higher product prices following the crude price advance. Overproduction in the second quarter forced reductions in product prices.

GAS-LIQUIDS production gained a little more than crude in 1957.

DOMESTIC DEMAND gained only 0.2 per cent in 1957. The increase in 1958 is expected to be 3.8 per cent.

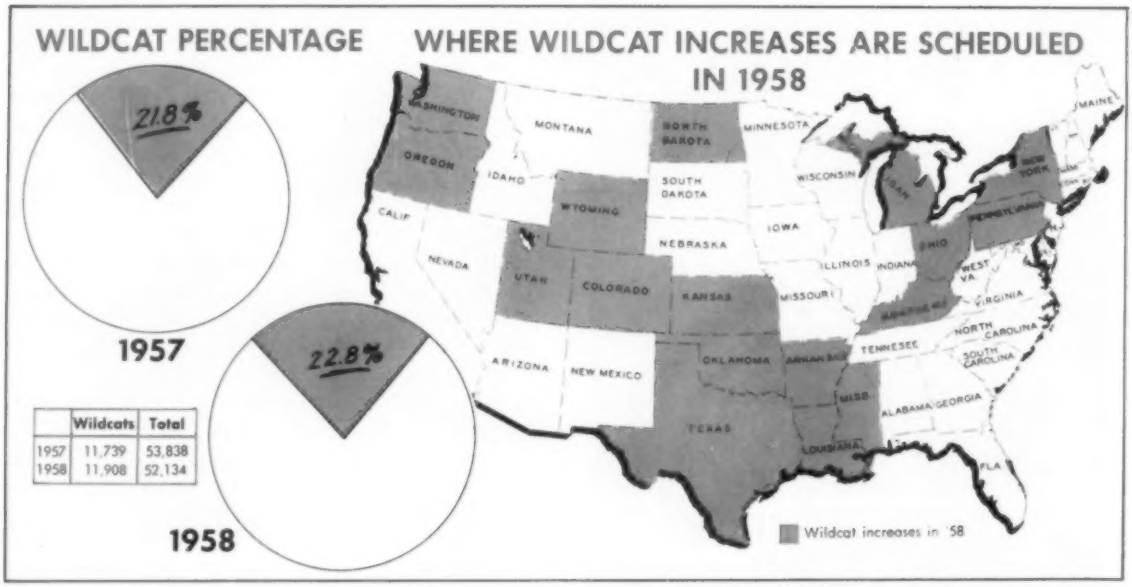
PRODUCT EXPORTS gained 25.6 per cent in 1957 but will be off in 1958.

IMPORTS increased less than in recent years. Foreign demand in the first quarter and quotas in the last quarter held total imports to a 5.8 per cent gain.

PETROCHEMICAL FORECASTS for 1957 were conservative.

PIPELINE CONSTRUCTION had its biggest year in 1957.

FOR DETAILS, SEE THE NEXT 85 PAGES



52,134 wells to go down in '58

TOTAL WELL COMPLETIONS will be down again in 1958, but the drop will be less than in 1957.

Reports from hundreds of both large and small operators are the basis for the Journal forecast of a reduction in drilling amounting to 1,704 wells compared with a drop of 4,322 wells in 1957. This reduction still leaves a total of 52,134 wells for 1958.

The over-all cut in well completions for 1958 will be in development drilling. Total field wells scheduled for 1958 account for 40,266 of total completions for the year. This represents a drop of 1,873 wells from the 1957 total.

Wildcat completions will be up 169 wells in 1958. The total is expected to be 11,908 wells. Despite this gain, the total for the year will be less than for either of the years 1955 or 1956.

The increase in wildcat drilling combined with the further decrease in field-well completions will raise the ratio of wildcats to total wells from 21.80 in 1957 to 22.84 for 1958. If actual drilling follows the plan indicated by reports from operators, the ratio of wildcats to total will be the highest since 1952.

In recent years, the wildcat ratio has tended to decrease in periods of lower crude-production allowables. In some cases, the independent producer in a production-prorated state may shift funds from wildcat to development drilling to add to his number of producing wells. Additional development wells may help the producer regain part of his allowable cut but they increase total producing capacity and may lead to further cuts in allowable per well.

There is another explanation for the decrease in wildcat percentage for 1957 and the probable increase in 1958. This contributing factor was the shift in the portions of total drilling by large operators. Past records have shown that independent producers put a larger percentage of their drilling dollars into wildcats than the larger operators do. A group of 30 large operators for the past few years have drilled about 22 per cent of total wells completed in this country. However, these producers have averaged drilling about 16 per cent of the wildcats. Thus, a shift to a higher percentage of total wells by large operators would mean a lower percentage of wildcats. When the independent producers increase their portion of total drilling, a gain in the wildcat-to-total ratio can be expected.

Drop Smaller Among Large Operators

Total drilling by the large-operator group in 1957 was down only 1.6 per cent from the record in 1956. Drilling by all other operators was off 9.0 per cent. This larger reduction by the wildcatting group is one reason for the drop of 9.9 per cent in exploratory drilling while development drilling was off 6.7 per cent.

Reports of plans show that the large companies as a group will make a bigger percentage cut in drilling for 1958 than the so-called independents. This shift shows up as a gain in wildcat drilling for 1958 and a reduction in development drilling.

There is another aspect of drilling trends by large vs. small operators that may influence drilling this year. Comparisons of company reports of plans at the first of the year with actual records of drilling at the end of the year show that, as a general rule, the

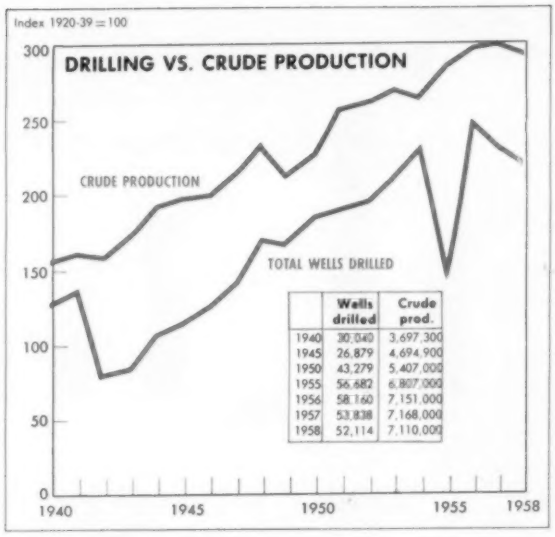
large companies hold closer to original plans than the smaller companies do.

The downturn of general business conditions in 1957, the disappointingly low demand for oil products, and cuts in allowables caused many small companies to cut back on drilling. A reverse trend can take place this year if the general economy turns up in the last half.

Tabulation of state forecasts seems to show a limit to the cuts in drilling. In many cases, the states with big reductions in 1957 will get only small cuts or may get small increases in 1958. States with near-normal activity in 1957 may be down in 1958.

Some states with hot drilling areas in 1947 will be in for a period of rapid development in 1958. At least 16 states should have more wildcat completions in 1958 than in 1957. If some of these open good areas early in the year, development drilling will expand faster than the rate shown by company plans.

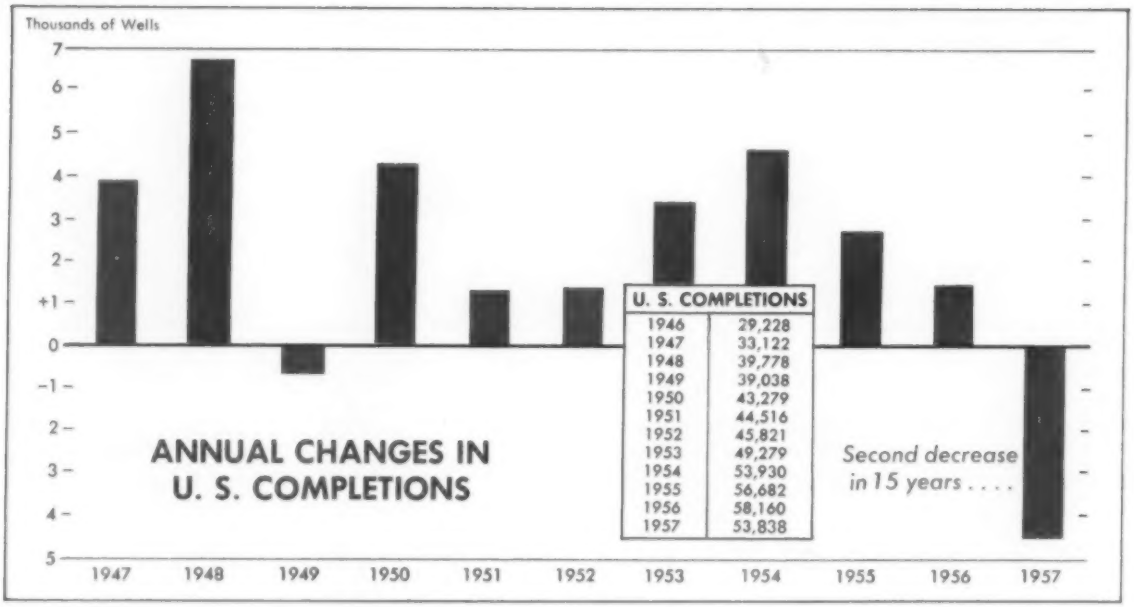
A few good discoveries would add both wildcat and development wells to the following forecast.



	Wells drilled	Crude prod.
1940	30,040	3,697,300
1945	26,879	4,694,900
1950	43,279	5,407,000
1955	56,682	6,807,000
1956	58,160	7,151,000
1957	53,838	7,168,000
1958	52,114	7,110,000

11,908 wildcats, 40,226 field wells, 215 million feet

	1958 forecast				Change from 1957			
	Wildcat wells	Field wells	Total wells	Total footage	Wildcat wells	Field wells	Total wells	Total footage
Alabama	26	14	40	243,000	— 2	— 36	— 38	— 484,000
Arkansas	232	741	973	2,998,000	17	— 158	— 141	— 391,000
California	469	1,706	2,175	9,458,000	—58	— 5	— 63	— 328,000
Colorado	575	268	843	4,412,000	25	— 37	— 12	— 64,000
Florida	8		8	50,000	— 1		— 1	— 8,000
Illinois	586	2,107	2,693	6,228,000	—42	49	7	30,000
Indiana	140	610	750	1,296,000	—15	11	— 4	— 5,000
Kansas	883	3,504	4,387	15,833,000	34	121	155	561,000
Kentucky	335	1,222	1,557	2,256,000	25	37	62	87,000
Louisiana	**686**	**3,040**	**3,726**	**28,876,000**	**7**	**— 137**	**— 130**	**—1,122,000**
North	230	1,195	1,425	5,254,000	19	— 41	— 22	— 31,000
Gulf	456	1,845	2,301	23,622,000	—12	— 96	— 108	—1,091,000
Michigan	158	325	483	1,399,000	6	22	28	82,000
Mississippi	208	212	420	3,193,000	14	20	34	258,000
Montana	168	266	434	2,097,000	—17	18	1	— 4,000
Nebraska	460	351	811	4,748,000	—14	— 61	— 75	— 451,000
Nevada	6		6	25,000	— 4		— 4	— 4,000
New Mexico	265	1,973	2,238	10,481,000	— 2	111	109	502,000
New York	15	391	406	473,000	4	— 41	— 37	— 17,000
North Dakota	161	193	354	2,420,000	12	26	38	263,000
Ohio	19	1,118	1,137	2,747,000	4	18	22	57,000
Oklahoma	797	5,197	5,994	20,849,000	50	— 291	— 241	— 745,000
Pennsylvania	22	605	627	2,136,000	4	— 210	— 206	— 529,000
South Dakota	8		8	29,000	—36		— 36	— 130,000
Texas	**5,094**	**14,920**	**20,014**	**84,876,000**	**90**	**—1,428**	**—1,338**	**—4,965,000**
Dists. 1 and 4	903	1,666	2,569	10,503,000	28	— 121	— 93	— 209,000
Dists. 2 and 3	740	1,689	2,429	15,855,000	45	— 40	5	9,000
Dists. 5 and 6	420	806	1,226	6,053,000	33	— 166	— 133	— 632,000
Dists. 7-B and 9	2,027	4,927	6,954	20,078,000	—35	— 439	— 474	—1,332,000
Dists. 7-C and 8	880	4,784	5,664	27,600,000	8	— 416	— 408	—1,949,000
Dist. 10	124	1,048	1,172	4,787,000	11	— 246	— 235	— 852,000
Utah	197	219	416	2,251,000	76	73	149	803,000
Washington-Oregon	8	2	10	50,000	1	2	3	7,000
West Virginia	29	660	689	1,882,000	— 4	13	9	12,000
Wyoming	324	561	885	4,002,000	14	8	22	154,000
Miscellaneous	29	21	50	137,000	—19	2	— 17	— 27,000
Total United States	**11,908**	**40,226**	**52,134**	**215,445,000**	**169**	**—1,873**	**—1,704**	**—6,456,000**
Western Canada	849	1,869	2,718	12,616,000	11	— 243	— 232	—1,065,000



Completions picture brightens a little

TOTAL WELL COMPLETIONS in the United States for 1957 fell off 7.4 per cent compared with 1956. This was a brighter picture than at midyear, when total completions were down 11 per cent over the same period in 1956.

. . . Oil wells. Oil-well completions were 27,476 in 1957, compared with 30,730 in 1956. The loss of 3,254 wells was a 10.6 per cent decrease. Condensate totals are not included in these figures. These accounted for 688 in 1957 and 428 in 1956.

. . . Gas wells. Total gas wells in the country were down 203 in 1957, a loss of 4.9 per cent. Net wells were 3,912 in 1957, compared with 4,115 last year.

. . . Dry holes. Dry holes drilled during 1957 totaled 21,762, including 1,061 service wells. Service wells are those drilled for water supply or for water or gas input. The industry drilled a total of 22,887 dry holes in 1956, including 1,049 service wells. The percentage decrease was 4.9.

. . . Footage. Total footage drilled in 1957, in round figures, was 221,901,000, compared with 233,902,000 the previous year, or a net less of 12,001,000. Percentage decrease was 5.1.

Total Texas completions were down a few wells, although West and East Texas districts had a good year and came up with healthy increases.

Total Oklahoma completions were down 1,821 wells in 1957, continuing a trend started 2 years ago. This, in part, is due to the reduction in shallow drilling.

Rocky Mountain states had a good year explorationwise, but total drilling of all states in this group was off from last year. Those areas showing more wells were Utah, North and South Dakota, and the San Juan basin of Northwest New Mexico. Those states having fewer completions were Colorado, off 367 wells; Nebraska, Wyoming, and Montana.

West Texas, Railroad Commission Districts 8 and 7-C, had a total of 6,072 wells in 1957, compared with 5,707 the previous year, an increase of 365 wells. Footage gain was 884,675 for the year.

Texas Panhandle was up 85 wells in 1957 to a total of 1,407 compared with 1,322 in 1956.

East Texas, Districts 5 and 6, gained 226 wells in 1957. Operators were busy on salt-dome exploration, general wildcatting, and development drilling of discoveries made the previous year. East Texas had 1,359 completions in 1957, compared with 1,133 in 1956.

West Central Texas, District 7-B, sagged early in the year and came up with 213 fewer completions in 1957. Total figures were 2,872 wells compared with 3,085 last year.

Southwest Texas, District 1, had the greatest loss. Total wells were 1,245 in 1957, compared with 1,603 last year, or a decrease of 358 wells.

Oklahoma figures were 6,235 total wells in 1957, compared with 8,056 the previous year, or a loss of 1,821 wells. Oil wells totaled 3,432 and 4,825 for 1957 and 1956 respectively, for a drop of 1,393 wells.

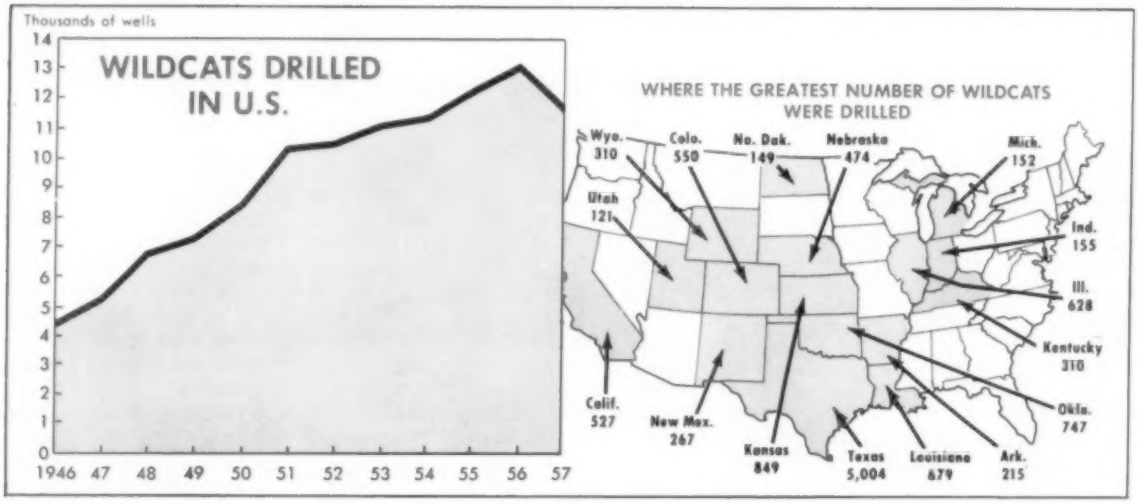
Illinois was a heavy loser, with 2,686 total completions in 1957 and 3,808 wells in 1956. Net loss was 1,122 wells.

Kansas operators completed 709 fewer wells in 1957. Total figures were 4,232 wells in 1957, compared with 4,941 wells the previous year.

The total count of the nation's completions, by states

	Total	Crude	Cond.	Gas	Dry	Service	Total footage	Average footage	Comp. 1956
Alabama	78	50	0	1	27	0	726,663	9,316	91
Arizona	8	0	0	4	4	0	21,309	2,664	2
Arkansas	1,114	709	0	21	383	1	3,389,155	3,042	1,002
California	2,238	1,554	1	53	617	13	9,785,928	4,373	2,306
Colorado	855	144	0	91	620	0	4,476,626	5,587	1,222
Florida	9	0	0	0	9	0	57,625	6,403	13
Georgia	2	0	0	0	2	0	9,146	4,573	8
Idaho	2	0	0	0	2	0	5,900	2,950	4
Illinois	2,686	1,065	0	19	1,602	0	6,198,530	2,308	3,808
Indiana	754	263	0	14	475	2	1,300,937	1,725	741
Kansas	4,232	1,911	2	333	1,909	77	15,271,765	3,609	4,941
Kentucky	1,495	511	0	164	820	0	2,167,173	1,450	1,936
Louisiana	3,856	1,905	117	380	1,453	1	29,997,919	7,779	3,875
North	1,447	799	3	116	529	0	5,285,143	3,652	1,702
South	1,738	731	110	180	716	1	18,260,683	10,507	1,747
Offshore	671	375	4	84	208	0	6,452,093	9,616	426
Michigan	455	180	0	47	228	0	1,316,508	2,893	437
Mississippi	386	111	21	3	251	0	2,934,306	7,602	441
Missouri	8	0	0	3	5	0	10,224	1,278	34
Montana	433	189	0	15	229	0	2,100,343	4,851	495
Nebraska	886	291	0	2	593	0	5,198,639	5,868	918
Nevada	10	0	0	0	10	0	28,663	2,863	3
New Mexico	2,129	1,095	18	606	408	2	9,979,733	4,687	1,904
Northwest	920	214	3	573	129	1	3,900,962	4,240	850
Southeast	1,209	881	15	33	279	1	6,078,771	5,028	1,054
New York	443	208	0	5	10	220	490,202	1,107	512
North Dakota	316	175	0	1	140	0	2,157,378	6,827	263
Ohio	1,115	593	0	201	237	84	2,689,147	2,412	1,086
Oklahoma	6,235	3,432	104	234	2,148	317	21,594,609	3,463	8,056
Oregon	3	0	0	0	3	0	22,236	7,412	5
Pennsylvania	833	302	0	292	94	145	2,664,778	3,199	748
South Dakota	44	1	0	0	43	0	158,490	3,602	9
Tennessee	35	0	0	7	28	0	57,147	1,633	7
Texas	21,352	12,205	424	881	7,663	179	89,840,271	4,207	21,519
Dist. 1	1,245	588	15	50	590	2	3,277,658	2,633	1,603
Dist. 2	764	200	64	145	355	0	4,662,871	6,103	777
Dist. 3	1,660	719	124	92	715	10	11,182,893	6,737	1,848
Dist. 4	1,417	494	111	131	675	6	7,434,291	5,246	1,475
Dist. 5 & 6	1,359	720	45	46	544	4	6,684,988	4,919	1,133
Dist. 7-B	2,872	1,394	3	32	1,437	6	8,977,295	3,126	3,085
Dist. 7-C & 8	6,072	4,734	17	58	1,217	46	29,548,675	4,866	5,707
Dist. 9	4,556	2,429	2	81	1,940	104	12,432,809	2,729	4,569
Dist. 10	1,407	927	43	246	190	1	5,638,791	4,008	1,322
Utah	267	133	0	12	122	0	1,447,953	5,423	141
Virginia	12	0	0	11	1	0	61,388	5,110	5
Washington	4	1	0	0	3	0	20,442	5,435	2
West Virginia	680	88	0	466	126	0	1,870,797	2,751	693
Wyoming	863	360	1	46	436	20	3,847,609	4,458	930
Total 1957	53,838	27,476	688	3,912	20,701	1,061	221,900,539	4,122	.....
Total 1956	58,160	30,730	428	4,115	21,838	1,049	233,902,000	4,022	*58,160
Total 1955	56,682	31,567	.....	3,613	20,742	760	226,270,000	3,992	.....
Total 1954	53,930	29,773	.....	3,977	19,168	1,012	218,986,000	4,061	.....
Total 1953	49,279	25,762	.....	3,806	18,449	1,262	198,839,000	4,035	.....
Total 1952	45,821	23,466	.....	3,255	17,618	1,482	187,190,000	4,085	.....

*Incl. Md. 3.



Wildcatting climb halted in '57

EXPLORATORY DRILLING in 1957 dropped behind the previous year's record high of 13,034 wildcats to 11,739. This is the first drop in wildcat completions in the United States since the war. The year's wildcat completions included 1,172 oil discoveries, 105 condensate strikes, 375 new gas pools, and 10,087 dry holes. Total exploratory footage drilled dropped from 62,027,000 (the previous record made in 1956) to 55,794,214 ft. This brings to a halt the climb in exploratory footage that began after the war.

Wildcat completions accounted for about 21 per cent of all wells completed in the United States. This is a 1 per cent drop from the previous year. In 1955 the ratio of wildcat drilling to total wells drilled was 21.6 per cent; in 1954 it was 20.9 per cent.

. . . **Average wildcat depth** in 1957 was 4,750 ft. compared to 4,759 in 1956. In 1955 it was 4,804 ft.; 4,831 ft. in 1954; 4,714 ft. in 1953.

. . . **Success ratio** of all wildcats drilled in 1957 was 10.9 per cent oil, 3.3 gas, and 85.8 dry. This is a marked decline in oil success ratio. The 1956 ratio was 12.4 per cent. In 1955 it was 14.8, 14.2 in 1954, and 14.2 in 1953. The dry-hole ratio is the highest in the past 5 years.

New Mexico's 21 per cent oil success ratio was the nation's highest, with North Dakota close behind at 16.1 per cent. Oklahoma's success ratio was 14.3 for oil, Louisiana 13.7.

The 1957 Story

In Texas . . . The Lone Star State continued its usual lead in the number of wildcats drilled with 5,004 wells put down exploring for oil and gas. There were 506 new oil fields in the state, 70 condensate, and 129 gas. Total footage drilled in wildcat drilling amounted to 23,056,622 ft. All Texas districts showed declines from 1956 drilling.

The low number of wildcat completions in Texas did not stop the explorers from tapping important new reservoirs, however. Southwest Texas, the far West Texas country, the Gulf Coast, and Panhandle all reported significant new strikes during the year. The

U. S. wildcatting results in '57

	Total	Per cent Oil	Gas	Dry
Texas	5,004	11.5	2.6	85.9
Oklahoma	747	14.3	4.1	81.6
Kansas	849	12.7	3.5	83.8
Illinois	628	4.8	0.2	95.0
Colorado	550	6.2	3.3	90.5
California	527	11.0	1.7	87.3
Louisiana	679	13.7	10.9	75.4
Wyoming	310	10.6	3.2	86.2
New Mexico	267	21.0	3.7	75.3
Nebraska	474	9.3	0.2	90.5
Kentucky	310	7.1	2.2	90.7
Indiana	155	5.8	0.0	94.2
Arkansas	215	9.8	3.2	87.0
Michigan	152	9.9	0.6	89.5
Utah	121	9.9	5.8	84.3
North Dakota	149	16.1	0.7	83.2
Others	602	5.6	8.3	86.1
Total 1957	11,739	10.9	3.3	85.8
Total 1956	13,034	12.4	3.6	84.0
Total 1955	12,271	14.8	2.9	82.3
Total 1954	11,280	14.2	3.5	82.3
Total 1953	11,062	14.2	3.3	82.5

1957 completions — wildcats . . . and field wells

	Wildcat completions						Field-well completions						
	Total	Crude	Cond.	Gas	Dry	Footage	Total	Crude	Cond.	Gas	Dry	Service	Footage
Alabama	28	0	0	1	27	161,700	50	50	0	0	0	0	564,963
Arizona	8	0	0	4	4	21,309							
Arkansas	215	21	0	7	187	802,542	899	688	0	14	196	1	2,586,613
California	527	58	0	9	460	2,795,223	1,711	1,496	1	44	157	13	6,990,705
Colorado	550	34	0	18	498	2,873,904	305	110	0	73	122	0	1,603,722
Florida	9	0	0	0	9	57,625							
Georgia	2	0	0	0	2	9,146							
Idaho	2	0	0	0	2	5,900							
Illinois	628	30	0	1	597	1,307,526	2,058	1,035	0	18	1,005	0	4,891,004
Indiana	155	9	0	0	146	247,755	599	254	0	14	329	2	1,053,182
Kansas	849	108	0	30	711	3,374,076	3,383	1,803	2	303	1,198	77	11,897,689
Kentucky	310	22	0	7	281	409,279	1,185	489	0	157	539	0	1,758,894
Louisiana	679	75	18	74	512	6,705,754	3,177	1,830	99	306	941	1	23,292,165
North	211	24	0	6	181	1,166,884	1,236	775	3	110	348	0	4,118,259
South	377	36	17	43	281	4,445,937	1,361	695	93	137	435	1	13,814,746
Offshore	91	15	1	25	50	1,092,933	580	360	3	59	158	0	5,359,160
Michigan	152	15	0	1	136	401,726	303	165	0	46	92	0	914,782
Mississippi	194	17	2	0	175	1,481,146	192	94	19	3	76	0	1,453,160
Missouri	2	0	0	0	2	2,381	6	0	0	3	3	0	7,843
Montana	185	10	0	2	173	897,498	248	179	0	13	56	0	1,202,845
Nebraska	474	44	0	1	429	2,693,115	412	247	0	1	164	0	2,505,524
Nevada	10	0	0	0	10	28,663							
New Mexico	267	56	0	10	201	1,386,539	1,862	1,039	18	596	207	2	8,593,194
Northwest	102	23	0	6	73	453,632	818	191	3	567	56	1	3,447,330
Southeast	165	33	0	4	128	932,907	1,044	848	15	29	151	1	5,145,864
New York	11	0	0	3	8	46,126	432	208	0	2	2	220	444,076
North Dakota	149	24	0	1	124	810,691	167	151	0	0	16	0	1,346,687
Ohio	15	4	0	3	8	54,421	1,100	589	0	198	229	84	2,634,726
Oklahoma	747	93	14	31	609	3,350,237	5,488	3,339	90	203	1,539	317	18,244,372
Oregon	3	0	0	0	3	22,236							
Pennsylvania	18	0	0	3	15	196,799	815	302	0	289	79	145	2,467,979
South Dakota	44	1	0	0	43	158,490							
Tennessee	34	0	0	6	28	55,797	1	0	0	1	0	0	1,350
Texas	5,004	506	70	129	4,299	23,056,622	16,348	11,699	354	752	3,364	179	66,783,649
Dist. 1	431	17	2	13	399	1,315,646	814	571	13	37	191	2	1,962,012
Dist. 2	255	13	15	24	203	1,658,433	509	187	49	121	152	0	3,004,438
Dist. 3	440	31	22	29	358	3,565,866	1,220	688	102	63	357	10	7,617,027
Dist. 4	444	46	22	22	354	2,495,422	973	448	89	109	321	6	4,938,869
East	387	17	0	2	368	1,988,658	972	703	45	44	176	4	4,696,330
Dist. 7-B	973	115	0	10	848	3,173,177	1,899	1,279	3	22	589	6	5,804,118
West	872	122	0	12	738	4,755,400	5,200	4,612	17	46	479	46	24,793,275
Dist. 9	1,089	135	0	13	941	3,338,318	3,467	2,294	2	68	999	104	9,094,491
Dist. 10	113	10	9	4	90	765,702	1,294	917	34	242	100	1	4,873,089
Utah	121	12	0	7	102	616,978	146	121	0	5	20	0	830,975
Virginia							12	0	0	11	1	0	61,388
Washington	4	1	0	0	3	20,442							
West Virginia	33	0	0	17	16	173,247	647	88	0	449	110	0	1,697,550
Wyoming	310	32	1	10	267	1,570,321	553	328	0	36	169	20	2,277,288
Total 1957	**11,739**	**1,172**	**105**	**375**	**10,087**	**55,794,214**	**42,099**	**26,304**	**583**	**3,537**	**10,614**	**1,061**	**166,106,325**
Total 1956	13,034	1,613		469	10,952	62,027,000	45,126	29,545		3,646	10,886	1,049	171,875,000

state's depth record was broken, the Palo Duro basin was opened to production, a new Gulf Coast producing-depth record was set, and the Panhandle got its deepest hole during the year.

In Kansas . . . Kansas exploration ranked second under Texas, numberwise, with 849 wildcat completions. There were 138 new oil and gas fields opened in the state during the year, most of them on the Central Kansas uplift as usual. No new significant exploratory trends appeared in 1957, however.

In Oklahoma . . . Wildcat completions were down from 1956 figures, but significant exploratory events were recorded in every corner of Soonerland.

Important new reserves were tapped in south-central counties, new drilling and producing-depth records set, a whole new province opened in the northwestern section of the state, and continued expansion of the pre-Permian play in the Panhandle. There were important discoveries along the south flank of the Anadarko basin, along the northern tier of counties from Harper to Grant, and new interest entered the southeastern section of the state, particularly in Sequoyah, LeFlore, Okmulgee, and Coal counties.

In the Rockies . . . This province has much to be proud of in 1957. Not only were there more wildcats drilled in the region than ever before, but more successful wildcat completions too. In 1956 there were 1,891 wildcats drilled in the states of Utah, Arizona, Colorado, Northwest New Mexico, Nebraska, Wyoming, Montana, North Dakota, and South Dakota. In these same states there were 1,943 wildcats drilled in 1957. In 1956 there were 174 successful completions in the region; in 1957 there were 230.

Not all the Rocky Mountain states had new records individually, however. The only states showing increases over the previous year were Nebraska, North Dakota, South Dakota, Utah, and Wyoming.

Centers of wildcat success in the Rockies in 1957 were the San Juan and Paradox basins, Williston, and

Western Canada drilled 2,950 wells, and 13.68 million feet

	Total wells					Total	Wildcats				
	Total	Oil	Gas	Dry	Footage	1956	Total	Oil	Gas	Dry	Footage
Alberta	1,434	878	138	418	7,464,947	1,861	414	56	49	309	2,234,730
Saskatchewan	1,199	850	18	331	5,185,819	1,092	295	44	8	243	1,175,765
Manitoba	222	134	0	88	507,706	252	68	2	0	66	183,861
British Columbia	92	10	48	34	513,332	56	58	8	26	24	360,967
Northwest Territories	3	0	0	3	9,565	0	3	0	0	3	9,565
Western Canada	**2,950**	**1,872**	**204**	**874**	**13,681,369**	**3,261**	**838**	**110**	**83**	**645**	**3,964,888**

the Nebraska portion of the Denver basin. Continued expansion of the Aneth trend in southeastern Utah was the highlight of exploratory success for the year. Important new reserves were opened in Wyoming and western Nebraska. There were 24 new oil fields opened in North Dakota in 1957 . . . a new record for that Williston state. Focal point of North Dakota success was Burke County with a dozen new fields opened and successful development of all.

The Wind River and Green River basins of Wyoming had significant gas discoveries during the year. The Powder River basin is coming into its own as a new wildcat target. Most production lies on the southern flanks, but 1957 saw the wildcat drill enter the center of the basin and the northeast flanks.

And Now?

Early 1958 information indicates that several regions in the country will see increased wildcat activity. Look for an increase in exploration in South and Southwest Texas (Districts 1 and 4), in the Panhandle counties, and in the more inland counties of the Texas Gulf Coast. The first major showing of Cotton Valley oil in South Mississippi is expected to set off a Jurassic play in this region. In the Rocky Mountains another record is likely in 1958 with the Paradox, San Juan, Green River, Powder River, Denver, Wind River, and Williston basins figuring highly. East Texas had one of its biggest wildcatting years in history in 1957 and expects another in 1958.

In the East, Ohio and northwestern Pennsylvania are already busy with a new wildcat campaign as a result of the recent Medina strike in Ashtabula County, Ohio. Wildcatting is expected to continue strong in West Texas and Southeast New Mexico. Although Oklahoma may not set any wildcat records in 1958, there will be an upsurge of rank and deep exploration in the southwest, west, and northwestern counties.

Completions by months, and by type of production

Wildcat Completions

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Oil	156	110	85	99	118	85	76	98	93	83	92	77
Cond.	12	3	12	10	16	4	3	4	9	11	11	10
Gas	48	39	31	29	47	29	26	20	22	27	25	32
Dry	1,107	758	710	675	935	661	875	1,037	799	990	709	831
Total	1,323	910	838	813	1,116	779	980	1,159	923	1,111	837	950

Development Completions

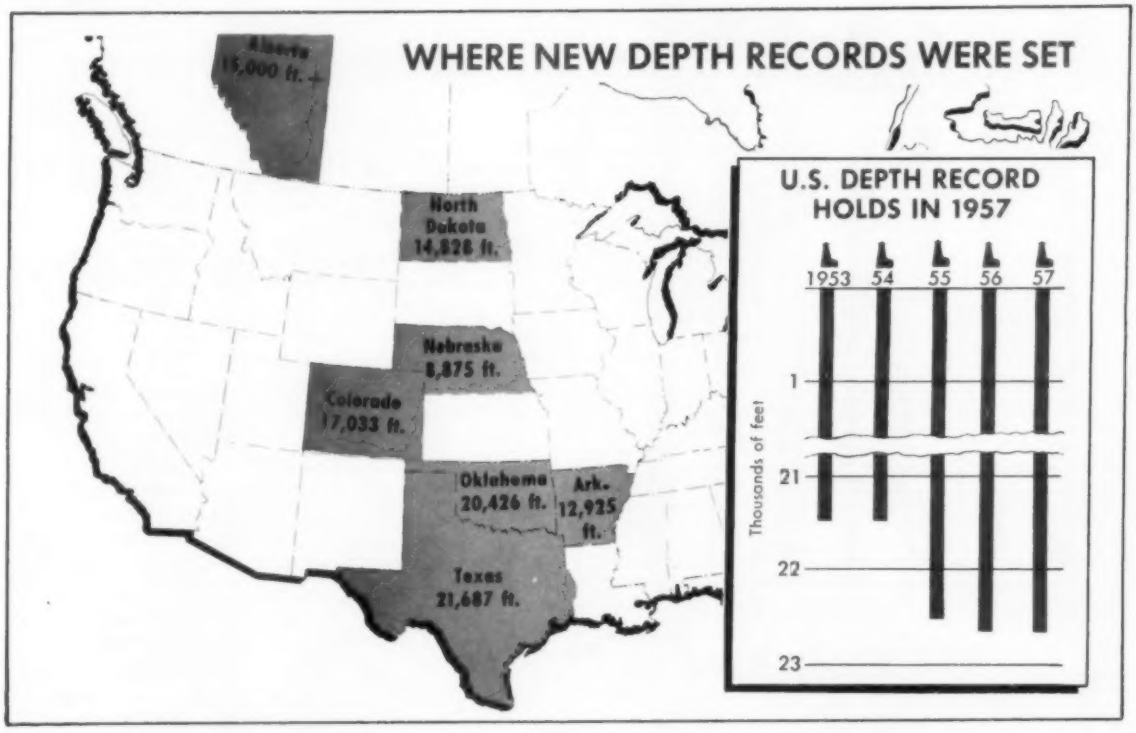
Oil	2,471	2,112	2,041	2,004	2,410	1,876	2,062	2,650	2,184	2,600	1,925	1,969
Cond.	28	8	26	31	46	26	40	71	67	67	77	98
Gas	311	258	312	220	283	256	286	347	291	386	254	333
Dry	1,012	712	916	784	995	809	930	1,276	966	1,237	999	1,039
Total	3,822	3,090	3,295	3,039	3,734	2,967	3,318	4,344	3,508	4,290	3,255	3,437

Total Completions

Oil	2,627	2,222	2,126	2,103	2,528	1,961	2,138	2,748	2,277	2,683	2,017	2,046
Cond.	40	11	38	41	62	30	43	75	76	78	88	106
Gas	359	297	343	249	330	285	312	367	313	413	279	365
Dry	2,058	1,419	1,439	1,372	1,837	1,404	1,717	2,219	1,662	2,146	1,625	1,803
Service	61	51	187	87	93	66	88	94	103	81	83	67
Total	5,145	4,000	4,133	3,852	4,850	3,746	4,298	5,503	4,431	5,401	4,092	4,387

Footage

Wildcat	6,456	4,323	4,154	3,956	5,469	3,878	4,432	5,315	4,322	5,114	3,969	4,405
Development	14,965	12,533	12,493	12,166	14,865	12,252	13,229	16,514	13,957	16,713	12,789	13,630
Total	21,421	16,856	16,647	16,122	20,334	16,130	17,661	21,829	18,279	21,827	16,758	18,035



Area records set, but U. S. marks hold

PRODUCTION-DEPTH records were broken in four areas during 1957 . . . Oklahoma, the Texas Gulf Coast, North Dakota, and North Louisiana. Nine areas set new drilling-depth records . . . West Texas, Oklahoma, Texas District 3, Southwest Texas, Colorado, the Texas Panhandle, North Dakota, Arkansas, and Nebraska.

Deeper Production

. . . **In Oklahoma** British-American Oil Producing Co. continued to push the drill downward in the Knox area of Grady and Stephens counties. The new record holder is the 1 Krieger on the Stephens County side of Knox field. Gas-condensate production was found in the Oil Creek sands of Ordovician age at 16,546 ft. The previous record was 2 Harrison in the same field at 14,510 ft.

. . . **In Texas' Gulf Coast** Phillips Petroleum Co. set a new producing-depth record at the 1 O'Daniel Unit, 3 miles southwest of Alta Loma townsite in the Alta Loma north extension area. The well made 7,000 M.c.f. of gas per day from Frio-sand perforations at 14,656-73, 14,680-90, 14,692-98, 14,706-18, and 14,740-47 ft.

. . . **In North Dakota** Amerada Petroleum Corp. set a new producing-depth record for the state in Beaver Lodge field and has other wells that may threaten it in the coming months. The 1 Hernfindahl-Kram in Williams County flowed oil from the Silurian at 11,744 ft. on completion. Three other wells were completed near this depth in the same field. The previous state record was in Sanish pool at 10,674 ft. (Pan American Petroleum Corp. 1 New Year Many Ribs).

. . . **In North Louisiana** Carter Oil Co. set a new producing-depth record—in the same field that last year's record well was in—Red Rock, Webster Parish. The new well is 1 Taylor-Duke Unit with oil production in the Smackover at 11,300 ft. This is the approximate depth of most of the deep wells in this field.

The Bit Continues Downward

The growing tendency toward ultradeep drilling throughout the nation's oil provinces continued unabated in 1957.

. . . **In West Texas** they're boasting the second deepest drilling-depth record in the nation's oil areas. It is Pan American 1 University "CS," Pecos County. The well was dry at 21,687 ft., total depth.

. . . **In Oklahoma** Magnolia Petroleum Co. 1 Sterba-Ordovician, Caddo County, is the Sooner State's deepest hole. This one went to 20,426 ft., still in the Mississippian. A well is now under way on the Fort Cobb anticline in southwestern Oklahoma that may even break the world's record in the next 2 years.

. . . **In Texas** (District 3) the new deep well is Humble 1 Robertson-McDonald, a Moss Bluff dome well in Liberty County. It was dry in the Vicksburg at 18,-074 ft.

. . . **In far Southwest Texas** the deepest well is now Humble 1 Mills Mineral Trust in Val Verde County. The Val Verde basin test went to 17,525 ft. in the Ellenburger before stopping.

These wells hold U. S. production-depth records

State or area—	Well and location; county—	Result	Year comp.	Pay zone	Prod. depth
South Louisiana	Richardson & Bass et al. 1-L Humble LL&E, 35-19s-27e; Plaquemines	Oil	1956	Miocene	21,443
California	Richfield 67-29 Coles Levee, North Coles Levee; Kern (not producing)	Cond.	1953	Eocene	17,892
Oklahoma	British-American 1 Krieger, Knox field; Stephens	Cond.	1957	Oil Creek	16,546
Southeast New Mexico	Continental 1-A Bell Lake, 31-23s-34e; Lea	Gas	1955	Devonian	15,025
West Texas	Phillips 1-E Puckett, Glenna pool; Pecos	Gas	1953	Ellenburger	15,000
Texas Gulf Coast	Phillips 1 O'Daniel Unit, Anita Loma field; Galveston	Cond.	1957	Frio	14,747
Southwest Texas	Amerada 1 Lowe Craig, Lowe Ranch field; McMullen	Gas	1956	Edwards	14,479
Mississippi	Union Producing et al. 1 Logan, Tinsley field; Yazoo (not producing)	Cond.	1951	Smackover	14,427
Wyoming	Pure 1 Unit, 11-33n-84w; Natrona	Oil	1948	Frontier	14,307
Montana	Sun-Phillips 2 Dynneson, Brorson; Richland	Oil	1955	Ordovician	12,654
East Texas	Tidewater 1 Ramey Unit, New Hope field; Franklin	Cond.	1954	Smackover	12,341
North Dakota	Amerada 1 Hernfindahl-Kvam, Beaver Lodge field; Williams	Oil	1957	Silurian	11,744
Florida	Humble 1 Gulf Coast, Sunniland field; Collier (now abandoned)	Oil	1943	Glen Rose	11,626
Alabama	Zach Brooks 1 Donovan, Citronelle field; Mobile	Oil	1955	Rodessa	11,414
Texas Panhandle	Phillips 1 Troy "A," M-2 Sec. 86, H&GN; Gray	Oil	1955	Ellenburger	11,370
North Louisiana	Carter 1 Taylor-Dutte Unit, Red Rock field; Webster	Oil	1957	Smackover	11,300
Utah	Carter 1 Peterson, 13-1s-1w (USM); Uintah	Oil	1952	Wasatch	10,244
North Texas	Weiner 1 Hazlip, Mineral Creek; Grayson	Cond.	1952	Mulder	10,160
Colorado	Delhi-El Paso 5 Barker, 2-32n-14w; La Plata	Gas	1950	Paradox	9,841
Northwest New Mexico	Southern Union 9 Barker Creek, 21-32n-14w; San Juan	Gas	1945	Pennsylvanian	9,468
Arkansas	Atlantic 1 McKamie-Patton C-216; Lafayette	Oil	1952	Smackover	9,453
South Dakota	Shell 1 State "A," Buffalo; Harding	Oil	1953	Red River	8,690
West Virginia	Ohio 1 Kuykendall et al., Dry Fork district; Tucker	Gas	1946	Oriskany	8,410
Pennsylvania	American Locomotive 5 Steiner, Uinty Twp.; Westmoreland	Gas	1946	Oriskany	8,014
Michigan	Michigan Gulf 1 Bateson, Kawkawlin field; Bay (now abandoned)	Oil	1946	Salina	7,850
Nebraska	Gulf 1 Sisson, 18-21n-58w; Kimball	Oil	1951	Dakota	7,431
Nevada	Shell 1 Unit, Eagle Springs; Nye	Oil	1954		6,730
Kansas	Pan American 1 Wall, 35-32s-23w; Clark	Oil	1951	Viola	6,576
Ohio	East Ohio 1 Phillips, Sec. 23, Washington Twp.; Harrison	Gas	1941	Silurian	5,899
New York	Kane 1 Lewis, West Union Twp.; Steuben	Gas	1942	Oriskany	5,228
Kentucky	United Carbon 1 Howe; Pike	Gas	1932	Devonian	5,170
Arizona	Humble 1 Navajo, 4-41n-28e; Apache	Oil	1955	Pennsylvanian	4,816
Illinois	Kingwood 24-A Shanafelt, 20-2n-2e; Marion	Oil	1943	Trenton	4,657
Maryland	Cumberland-Allegheny S-424 Beachy, Ryans Glade 8 dist.; Garrett	Gas	1949	Oriskany	4,456
Tennessee	Nelson 1 Boos; Anderson (Briceville area)	Gas	1955		3,404
Indiana	Lewis 1 Hill, 35-3s-14w; Posey	Oil	1939	McClosky	3,144
Missouri	Cities Service 1 Cook, Tarkio field; Atchison	Oil	1944	Bartlesville	1,444

. . . while these are record setters for drilling depth

State or area—	Well and location; county—	Result	Year comp.	Deepest formation	Total depth
South Louisiana	Richardson & Bass 1 LLE-Humble "L"; Plaquemines	Oil	1956	Miocene	22,570
West Texas	Pan American 1 Univ. "CS"; Pecos	Dry	1957		21,687
California	Ohio 72-4 K.C.L.-A, Paloma field; Kern	Dry	1954	Miocene	21,482
Wyoming	Superior 1 Unit, 27-27n-103w; Sublette	Dry	1949	Dakota	20,521
Mississippi	Vasen 1 Fee, 9-2s-11w; Stone	Idle			20,450
Oklahoma	Magnolia 1 Sterba-Ordovician, 35-6n-10w; Caddo	Active		Mississippian	20,426
Texas (Dist. 2)	Magnolia A-417, West Ranch; Jackson	Oil	1955	Jackson	19,062
Texas (Dist. 3)	Humble 1 Robertson-McDonald, Moss Bluff dome; Liberty	Dry	1957	Vicksburg (?)	18,074
Texas, South	Superior 27 Welder, Portilla field; San Patricio	Oil	1951		17,966
Texas, Southwest	Humble 1 Mills Mineral Trust, Val Verde, 128-I&GN-Blk. 1	Dry	1957	Ellenburger	17,525
Colorado	Phillips 1 Manuel, 27-1n-95w; Rio Blanco	Gas	1957	Weber	17,033
Southeast New Mexico	Phillips 6 Lea-Mex, 23-17s-33e; Lea	Oil	1956	Granite	16,842
East Texas	Humble 1 McWatters; Freestone	Oil	1949	Smackover	16,347
Texas Panhandle	Magnolia 1 Feldman; Hemphill	Gas	1957	Ellenburger	15,997
Alabama	Humble 1 Williams, 10-3n-2e; Clark	Oil	1952	Jurassic	15,729
Florida	Gulf 1 State; Monroe	Dry	1947		15,155
North Louisiana	Cotton Valley 2 Banks, Cotton Valley field; Webster	Dry	1947	Salt	14,967
North Dakota	Amerada 9-A Unit, Beaver Lodge; Williams	T. abd.	1957		14,828
North Texas	Humble 1 Williams, D. Yglesias Sur. A-1393; Grayson	Dry	1953		14,363
Montana	Mountain States-Phillips 1 NP; Carbon	Dry	1956	Chugwater	13,830
Utah	Equity & Pacific Western 1 Unit; Grand	Dry	1949	Pennsylvanian	13,767
Northwest New Mexico	Magnolia 1 Jicarilla "A," 18-23n-2w; Rio Arriba	Gas	1955		13,590
West Virginia	Hope 9634; Wood	Dry	1955		13,331
Arkansas	Hunt 1 McDonald, 1-20s-21w; Columbia	Dry	1957	Salt	12,925
Oregon	Sinclair 1 Federal-Mapleton, 12-16s-10w; Lane	Dry	1955		12,880
Idaho	Phillips-Utah Southern 1 Juniper, 10-14s-30e; Oneida	Dry	1952		12,844
Pennsylvania	The California Co. 1 Bennett; Sullivan	Dry	1951	Siluro-Ord.	12,343
Nevada	Continental-Standard of Calif. 1 Unit, 32-20n-60e; White Pine	Dry	1952		11,543
New York	New York State Nat. Gas Co. 1 Kesselring, Van Etten Twp.; Chemung	Dry	1952	U. Cambrian	11,145
Michigan	Ohio-Pure 1 Reinhardt, 35-22n-2e; Ogemaw	Dry	1948	Cambro-Ord.	11,012
Washington	Standard of Calif. 1 Alderwood; Snohomish	Dry	1947	Mid. Eocene	11,002
North Carolina	Jersey Standard 1 Hatteras Light; Dare	Dry	1946	Granite	10,054
Virginia	The California Co. 1 Kipps; Montgomery	Dry	1949	Ordovician	9,936
South Dakota	Shell 1 Homme, 13-20n-12e; Perkins	Dry	1951	Granite	9,348
Nebraska	Shell 2 Schneider "L," Heidemann field; Kimball	Oil	1957	Precambian	8,875
Kentucky	Shell 1 Davis; Crittenden	Dry	1956		8,821
Kansas	Pan American 1 Feathers, 15-35s-33w; Seward	Gas	1947	"Crystalline"	8,243
Maryland	Snee 1 Schartzer; Garrett	Dry	1941	Helderberg	8,165
Ohio	Ohio 1-C Knowlton, Sec. 10, Independence Twp.; Washington	Dry	1933	Clinton	7,889
Illinois	Superior 17 H. C. Ford "C" Lease, New Harmony; White	Oil	1952	Salem	7,682

√ DRILLING

Cable tools still losing out to rotary drilling

A SURVEY of 1957 drilling operations throughout the United States revealed that about 13.5 per cent of all wells drilled were put down with cable tools. This is a decrease from the previous year when 16.3 per cent of all wells were drilled with cable tools. Rotary rigs drilled the remaining wells in the nation.

The 1957 percentage figures are based on an estimated 7,289 cable-tool completions versus 46,549 rotary-tool completions. Total well completions in the United States in 1957 fell to 53,838 from the previous year's record high of 58,160.

... Ohio. The biggest percentage of cable-tool drilling was in Ohio. Operators completed 1,103 wells out of a total 1,115, using cable tools for drilling. This is 98.9 per cent.

... Kentucky. Cable-tool completions here accounted for 71.6 per cent of all wells drilled. There were 1,070 wells drilled in Kentucky with cable tools; 425 with rotary tools.

... West Virginia. Cable-tool completions accounted for 96.9 per cent of all wells drilled. There were 659 wells drilled with cable tools; 21 with rotary tools.

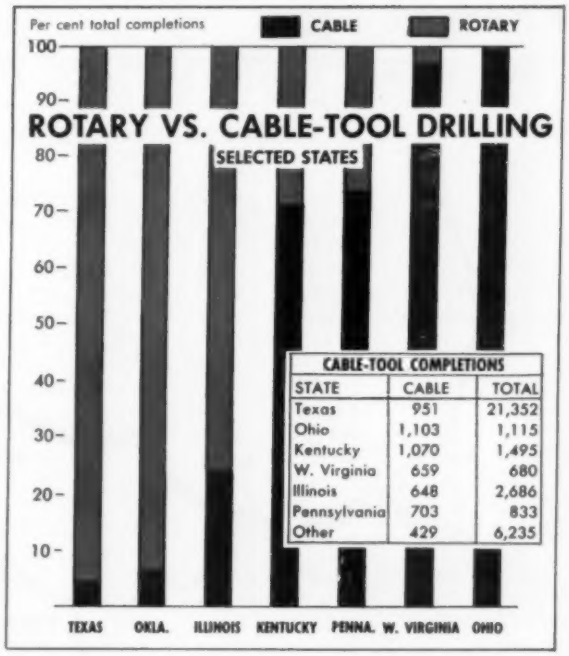
... Illinois. There were 648 wells drilled with cable tools, or 24.1 per cent of the total 2,686 wells.

... Pennsylvania. Operators drilled 658 wells with cable tools, or 79.0 per cent of the total 833. There were 175 wells drilled in Pennsylvania with rotary tools. This is the highest in history. The increase in rotary-tool drilling is due to the increased hunt for gas in the deeper horizons of North Central Pennsylvania.

... Oklahoma. The cable-tool completions continued their downward trend. There were 429 wells drilled with cable tools, or 6.9 per cent of the total 6,235 wells. The decrease in stripper-area development in eastern and northeastern Oklahoma has cut into the number of cable-tool completions. The same is true for Kansas where 283 wells were drilled with cable tools versus 3,949 with rotary. This is a considerable drop from the previous year when 815 wells were drilled with cable tools.

... Rocky Mountain states. Wells drilled with cable tools in Montana amounted to 89 versus 344 drilled with rotary; Wyoming cable toolers drilled 121 wells versus 742 with rotary.

... Texas. Total Texas well completions fell from the previous year's high to 21,352. Of this total, 4.4 per cent were drilled with cable tools; the other 20,401 wells drilled with rotary tools. Biggest cable-tool areas in Texas are West and West Central.

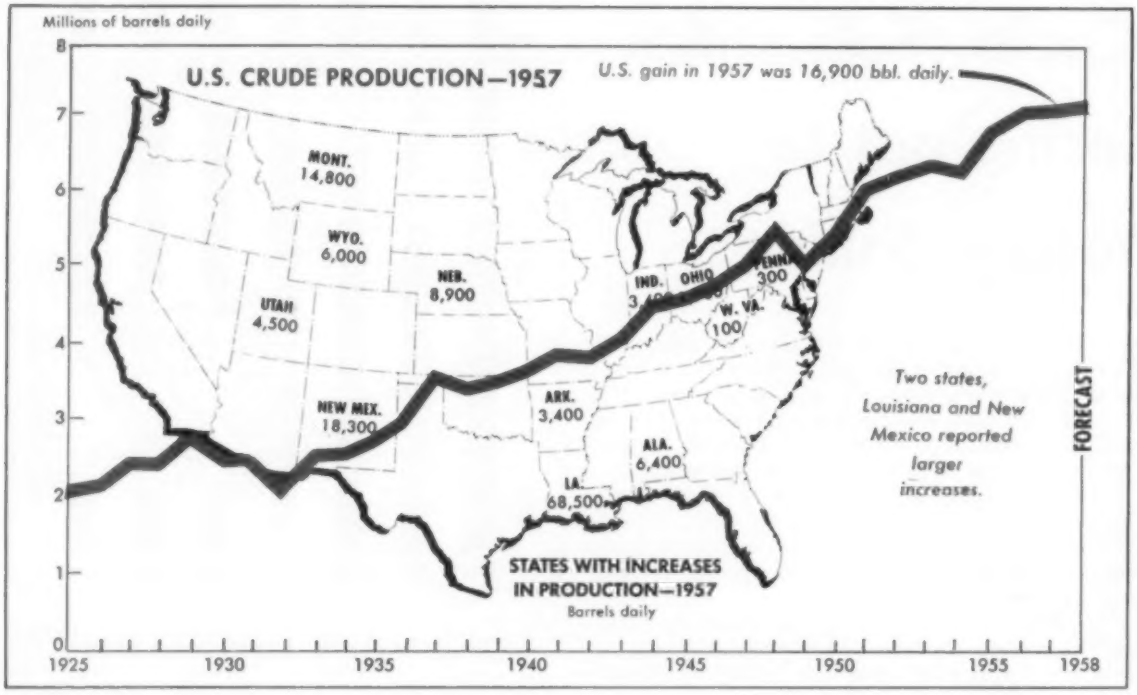


CABLE-TOOL COMPLETIONS

STATE	CABLE	TOTAL
Texas	951	21,352
Ohio	1,103	1,115
Kentucky	1,070	1,495
W. Virginia	659	680
Illinois	648	2,686
Pennsylvania	703	833
Other	429	6,235

State-by-state completions

	Cable	Rotary	Total comp.
Alabama	4	74	78
Arkansas	11	1,103	1,114
Arizona	0	8	8
California	0	2,238	2,238
Colorado	0	855	855
Florida	0	9	9
Georgia	0	2	2
Idaho	2	0	2
Illinois	648	2,038	2,686
Indiana	417	337	754
Kansas	283	3,949	4,232
Kentucky	1,070	425	1,495
Louisiana	0	3,856	3,856
Michigan	287	168	455
Mississippi	1	385	386
Missouri	8	0	8
Montana	89	344	433
Nebraska	11	875	886
Nevada	2	8	10
New Mexico	47	2,082	2,129
New York	439	4	443
North Dakota	1	315	316
Ohio	1,103	12	1,115
Oklahoma	429	5,806	6,235
Oregon	0	3	3
Pennsylvania	658	175	833
South Dakota	0	44	44
Tennessee	35	0	35
Texas	951	20,401	21,352
Utah	1	266	267
Virginia	12	0	12
Washington	0	4	4
West Virginia	659	21	680
Wyoming	121	742	863
Total 1957	7,289	46,549	53,838
Total 1956	9,484	48,676	58,160



Crude production gained—but barely

CRUDE PRODUCTION barely made the increase column last year. Some people say that the records show a decrease. It was that close.

Actual data from the Bureau of Mines for 10 months of 1957 and 2 months of industry figures show a production total of 2,616,284,000 bbl. This is almost a million barrels less than the all-time record set in 1956. But, 1956 was a leap year with one extra producing day.

On a daily average basis, the 1957 total of 7,167,900 bbl. daily was ahead of 1956 by 16,900 bbl. daily. If there was a new record in 1957, it can be credited to the closing of the Suez Canal.

The gain of 16,900 bbl. daily was less than the gain in crude exports. For the past several years, exports of crude have been averaging between 30,000 and 40,000 bbl. daily.

Following the closing of Suez at the end of October 1956, crude exports jumped to 278,000 bbl. daily for November and to 340,000 bbl. daily for December. The average for the first quarter of 1957 was 329,000 bbl. daily. The delayed influence of the Suez crisis accounted for some extra exports in the second quarter that held the average for that period at 159,000 bbl. daily.

The crude export average for 1957 is estimated at 136,000 bbl. daily compared with 78,000 bbl. daily in 1956. Thus the gain in exports of 58,000 bbl. daily was greater than the increase in crude production.

The Suez shortage lowered imports into this country in the first quarter of 1957, and government action set a limit on crude imports in the last quarter. The result was a total-import gain of 84,000 bbl. daily in 1957 compared with 188,000 bbl. daily in 1956 and 196,000 bbl. daily in 1955.

Total exports also gained more than total imports in 1957. Exports of crude and products increased 131,000 bbl. daily last year compared with the 84,000-bbl.-daily gain for imports. This balance indicates that the poor showing by domestic demand was an important factor in limiting crude production in 1957.

Only seven of the producing states set new records in 1957. These were: Alabama, Louisiana, Montana, Nebraska, New Mexico, Utah, and Wyoming.

The big gains for the year were in Louisiana, New Mexico, Montana, Nebraska, and Alabama. States with important reductions were Texas, California, Illinois, Colorado, and Oklahoma. The gain in Louisiana just about offset the loss in Texas.

High stocks at the end of 1957 and the demand outlook for 1958 show a need for a cut in crude production in 1958. First-quarter production will be higher than the average for the fourth quarter of 1957 but well below the record for the first quarter last year.

U. S. production of crude oil and lease condensate

(Thousands of barrels)

	1957 prod. change	1957	1956	1955	1954	1953	1952	1951	Cum. prod.
Alabama	2,349	5,418	3,069	1,411	1,584	1,694	1,279	1,020	18,138
Arkansas	1,154	30,509	29,355	28,369	29,130	29,681	29,440	29,798	1,002,384
California	−11,454	339,300	350,754	354,812	355,865	365,085	359,450	354,561	11,099,425
Colorado	−3,682	54,834	58,516	52,653	46,206	36,402	30,381	27,823	453,809
Florida	−20	459	479	495	548	543	591	596	5,291
Illinois	−4,081	78,265	82,346	81,423	66,798	59,026	60,089	60,243	1,994,506
Indiana	1,214	12,727	11,513	10,988	11,204	12,823	12,037	11,100	283,115
Kansas	−485	123,719	124,204	121,669	119,317	114,566	114,807	114,522	2,958,682
Kentucky	−836	16,792	17,628	15,518	13,791	11,518	11,918	11,622	351,033
Louisiana	24,183	323,604	299,421	271,010	246,558	256,632	243,929	232,281	4,434,451
Michigan	−571	10,169	10,740	11,266	12,028	12,285	13,251	13,927	405,913
Mississippi	−1,541	39,283	40,824	37,741	34,240	35,620	36,310	37,039	545,116
Montana	5,373	27,133	21,760	15,654	14,195	11,920	9,606	8,958	277,477
Nebraska	3,201	19,405	16,204	11,203	7,783	6,344	2,660	2,558	73,541
Nevada	−37	27	64	64	33	.....	.....	.....	188
New Mexico	6,424	94,317	87,893	82,958	74,820	70,441	58,681	52,719	1,204,224
New York	−45	2,703	2,748	2,904	3,257	3,800	4,242	4,254	190,509
North Dakota	−213	13,282	13,495	11,143	6,025	5,183	1,549	25	50,702
Ohio	685	5,470	4,785	4,353	3,880	3,610	3,350	3,140	649,587
Oklahoma	−2,177	213,685	215,862	202,817	185,851	202,570	190,435	186,869	7,633,198
Pennsylvania	76	8,306	8,230	8,531	9,107	10,649	11,233	11,345	1,202,974
Texas	−24,075	1,083,733	1,107,808	1,053,297	974,275	1,019,164	1,022,139	1,010,270	20,993,545
Utah	1,634	4,100	2,466	2,227	1,905	1,807	1,737	1,305	17,428
West Virginia	50	2,229	2,179	2,320	2,902	3,038	2,602	2,757	458,987
Wyoming	1,881	106,711	104,830	99,483	93,533	82,618	68,074	68,929	1,539,976
Other states	−6	104	110	119	153	63	46	50	2,501
Total U. S.	**−999**	**2,616,284**	**2,617,283**	**2,484,428**	**2,314,988**	**2,357,082**	**2,289,836**	**2,247,711**	**57,846,700**
Daily average	**+17**	**7,168**	**7,151**	**6,807**	**6,342**	**6,458**	**6,256**	**6,158**	

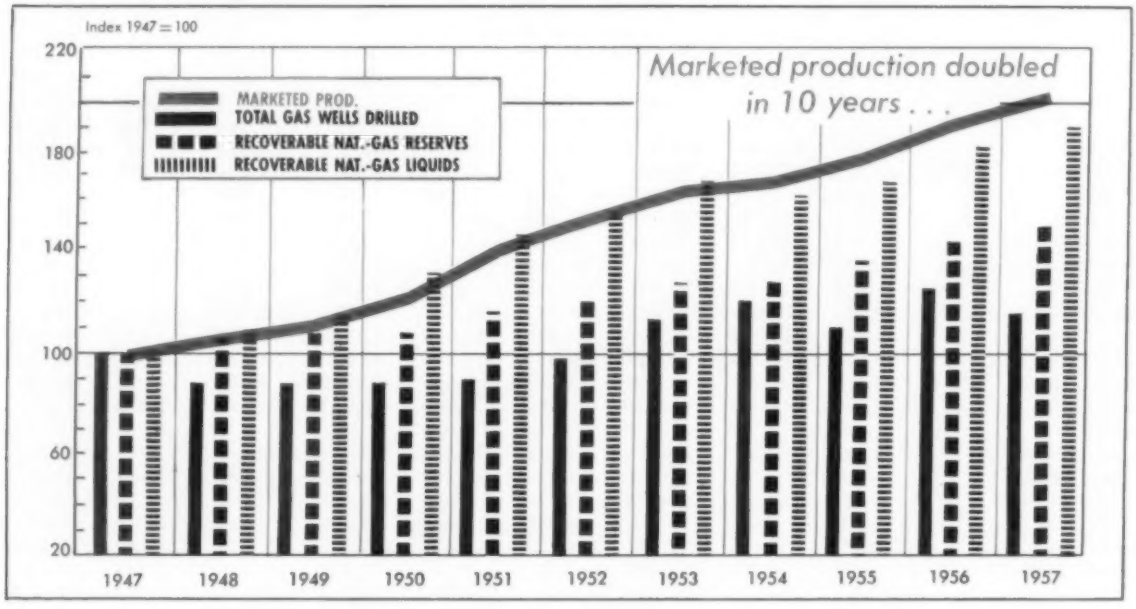
Production per well by states

	Bbl. daily 1957	Producing wells	Daily avg. per well
Alabama	14,844	201	73.9
Arkansas	83,586	5,292	15.8
California	929,589	37,234	25.0
Colorado	150,230	2,198	68.3
Florida	1,257	11	114.3
Illinois	214,425	37,791	5.7
Indiana	34,869	5,209	6.7
Kansas	338,956	38,258	8.9
Kentucky	46,006	18,060	2.5
Louisiana	886,586	22,018	40.3
Michigan	27,860	4,185	6.7
Mississippi	107,625	2,430	44.3
Montana	74,337	4,080	18.2
Nebraska	53,164	1,185	44.9
Nevada	74	3	24.7
New Mexico	258,403	10,358	24.9
New York	7,405	17,535	0.4
North Dakota	36,389	917	39.7
Ohio	14,986	19,996	0.7
Oklahoma	585,438	77,610	7.5
Pennsylvania	22,756	56,120	0.4
Texas	2,969,132	180,850	16.4
Utah	11,233	237	47.4
West Virginia	6,107	14,349	0.4
Wyoming	292,359	6,490	45.0
Other states	285	168	1.7
Total U. S.	7,167,901	562,785	12.7

Producing records by states

(Thousands of barrels)

	Record year		Production in record year
Alabama	1957	.....	5,418
Arkansas	.....	1925	77,398
California	.....	1953	365,085
Colorado	.....	1956	58,516
Florida	.....	1951	596
Illinois	.....	1940	147,647
Indiana	.....	1953	12,823
Kansas	.....	1956	124,204
Kentucky	.....	1956	17,628
Louisiana	1957	.....	323,604
Michigan	.....	1939	23,462
Mississippi	.....	1948	45,761
Montana	1957	.....	27,133
Nebraska	1957	.....	19,405
Nevada	.....	1956	64
New Mexico	1957	.....	94,317
New York	.....	1882	6,685
North Dakota	.....	1956	13,495
Ohio	.....	1896	23,941
Oklahoma	.....	1927	277,775
Pennsylvania	.....	1891	31,424
Texas	.....	1956	1,107,808
Utah	1957	.....	4,100
Virginia	.....	1947	61
West Virginia	.....	1900	16,196
Wyoming	1957	.....	106,711



Key states drilled fewer gas wells

DRILLING ACTIVITY in the natural-gas industry slumped to 3,860 completions, down 255 wells from the 1956 figure of 4,115, the all-time high in gas drilling. Nearly all states registered fewer gas wells than in 1956 with Oklahoma 87 wells under the previous year.

Operators did fairly well during the year in finding new reserves, registering an estimated net gain of 10,506 billion cubic feet or approximately 1 year's supply based on present rate of production. This, however, is considerably under the amount added during 1956 when drilling added an additional 14,077 billion cubic feet.

One bright spot is the continued demand for natural gas. Marketed production for 1957 was 10,638,600 million cubic feet, an increase of 5.5 per cent

Dozen states produced 95.6 per cent of the U. S. natural gas

(Millions of cubic feet)

State—	1957	Per cent change over 1956	1956	Per cent change over 1955	1955	Per cent change over 1954	1954	Cumulative 1906-57	Cum. per cent of U. S.
Texas	5,256,400	5.1	4,999,889	5.7	4,730,798	3.9	4,551,232	59,882,296	40.6
Louisiana	1,962,600	4.0	1,886,302	12.3	1,680,032	20.1	1,399,222	20,920,474	14.2
New Mexico	732,800	17.0	626,340	15.8	540,664	20.3	449,346	5,073,009	3.4
Oklahoma	675,400	—0.5	678,603	10.3	614,976	—0.2	616,355	13,691,102	9.3
Kansas	567,000	7.8	526,091	11.7	471,041	14.2	412,369	6,744,714	4.6
California	489,000	—3.1	504,458	—6.3	538,178	6.1	507,289	13,996,148	9.5
West Virginia	203,900	—0.4	204,717	—3.6	212,403	10.9	191,601	9,610,007	6.5
Mississippi	193,200	4.4	185,137	13.5	163,167	16.2	140,448	1,573,526	1.1
Pennsylvania	107,200	2.6	104,508	5.3	99,172	—32.0	145,934	5,421,242	3.7
Wyoming	90,000	6.6	84,398	8.5	77,819	9.5	71,068	1,650,579	1.1
Colorado	125,000	130.6	54,205	10.3	49,152	7.5	45,705	457,651	0.3
Kentucky	72,000	—2.3	73,687	0.6	73,214	0.7	72,713	1,866,191	1.3
Subtotal	10,474,500	5.5	9,928,335	7.3	9,250,616	7.5	8,603,282	140,886,939	95.6
Other states	164,100	6.8	153,588	—0.7	154,735	11.1	139,264	6,533,164	4.4
Total U. S.	10,638,600	5.5	10,081,923	7.2	9,405,351	7.6	8,742,546	147,420,103	100.0

Uncertainties restricted drilling

State—	1956 Field wells	1956 Successful wildcats	1957 Field wells	1957 Successful wildcats	Change in total wells
Arkansas	5	8	14	7	8
California	42	9	44	9	2
Colorado	87	20	73	18	—16
Illinois	58	5	18	1	—44
Indiana	6	1	14		7
Kansas	334	47	303	30	—48
Kentucky	164	1	157	7	—1
Louisiana	338	63	306	74	—21
Michigan	10	2	46	1	35
Mississippi	4	1	3		—2
Montana	6	1	13	2	8
Nebraska		1	1	1	1
New Mexico	664	10	596	10	—68
Ohio	173	5	198	3	23
Oklahoma	280	41	203	31	—87
Pennsylvania	225	11	224	16	4
Texas	689	205	752	129	—13
Utah	13	5	5	7	—6
West Virginia	491	15	449	17	—40
Wyoming	40	12	36	10	—6
Others	17	6	17	15	9
Total U. S.	3,646	469	3,472	388	—255

Reserves up 10½ trillion feet

(Billion cubic feet at 60° F. and 14.65 psia.)

	Jan. 1, 1957*	Jan. 1, 1958	Change
Arkansas	1,172	1,173	1
California	8,751	8,610	—141
Colorado	2,423	2,620	197
Illinois	220	205	—15
Indiana	34	33	—1
Kansas	17,566	18,400	834
Kentucky	1,246	1,225	—21
Louisiana	45,054	48,600	3,546
Michigan	362	388	26
Mississippi	2,403	2,220	—183
Montana	696	680	—16
Nebraska	225	247	22
New Mexico	23,473	25,200	1,727
New York	85	87	2
North Dakota	397	514	117
Ohio	854	882	28
Oklahoma	13,775	14,500	725
Pennsylvania	776	790	14
Texas	112,729	116,100	3,371
Utah	620	710	90
Virginia	36	37	1
West Virginia	1,562	1,532	30
Wyoming	3,236	3,425	189
Miscellaneous	81	103	22
Total U. S.	237,775	248,281	10,506

*American Gas Association figures as of Jan. 1, 1957.

over 1956 production. Natural gas is a desirable fuel and more and more consumers are converting to it in preference to other forms such as oil or coal. Producers can look to the day when many undersaturated markets such as the Chicago, Detroit, and St. Louis areas will be exploited. All this can only mean an increasing demand for natural gas.

Rockies . . . The scene is shifting away from Northwest New Mexico to northwestern Colorado and southwestern Wyoming. At the start of 1958, there were at least 20 wildcats seeking gas reserves in the Green River and Red Desert basins of Wyoming. Several significant strikes in this part of Wyoming have given impetus to the gas search that has been steadily building up since the first promise of a pipeline outlet. Now with the recent completion of the Pacific Northwest Pipeline, we can expect an expansion of the gas search into these newer provinces. Temporarily, at least, the drilling peak has been reached in Northwest New Mexico, but operators are now exploiting deeper pay zones such as the Dakota sandstone with considerable success.

Mid-Continent . . . The year 1957 has clearly seen the emergence of the northwestern Anadarko basin as a major gas province. Operators have had phenomenal success in drilling for Morrow and Atokan sands in northwestern Oklahoma, the Oklahoma and Texas panhandles, and southwestern Kansas. And they are attempting to extend the play into southeastern Colorado. The Memphis decision has certainly caused many operators to alter their drilling plans for the Morrow and Atokan play, but 1958 will see a continued increase in drilling.

Texas . . . Wise County in North Texas is becoming an important gas area. At the close of the year there were 46 rigs busy, developing reserves found at 6,000-6,500 ft. December drilling in the area gives a good idea of what can be expected; there were 60 completions during the month. And this tempo is expected to continue throughout the majority of 1958.

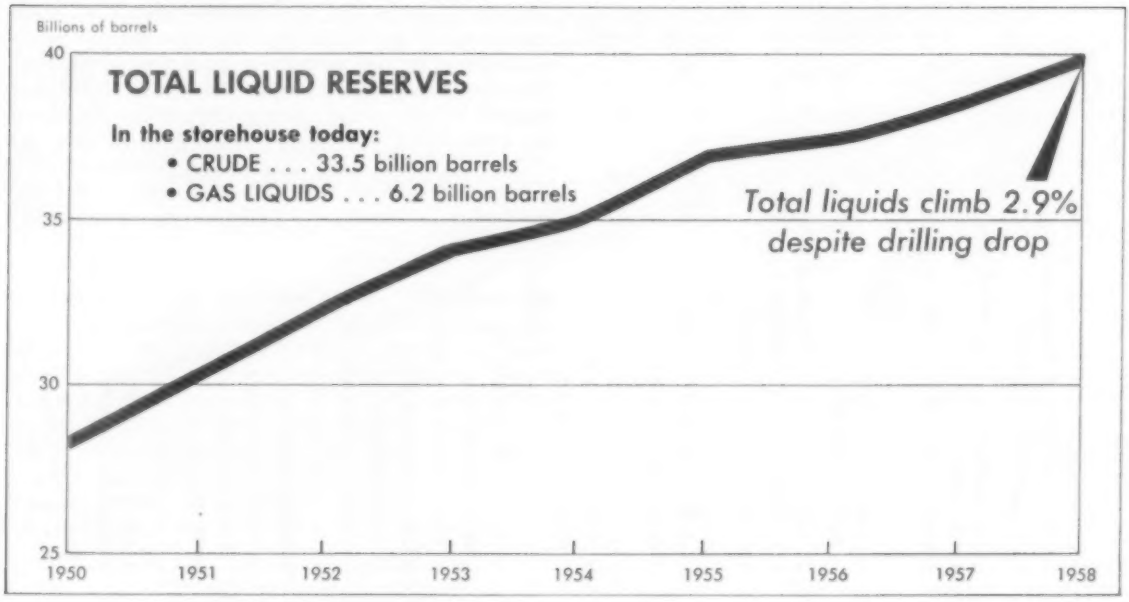
Southwest Texas will witness about the same type of gas drilling during 1958 as it saw in 1957, a slow and steady campaign aimed at developing Frio and Edwards production.

Louisiana . . . Operators will continue to find and exploit deep gas reserves in North Louisiana. Principal pay zones are sands in the Cotton Valley section and the Smackover limestone which produces both gas and condensate in many fields. Experts believe that most of the large fields on this play have been tapped, but there are still many small ones yet to be discovered.

South Louisiana will see a continued expansion of the gas search, but the drilling depths and high well costs will prevent any real drilling boom. Offshore the problems of even higher cost and abnormally long payouts face the operators. The quest for gas offshore will continue to expand, but at a slow rate. The large piercement-type salt domes have been the first offshore targets, because of their size. However, these are not good bets for gas exploration on 320 or even 640-acre spacing, because even 40 or 80-acre development wells are usually wildcats.

Arkansas . . . Operators are attempting to build up sufficient reserves in northwestern Arkansas to justify a pipeline to some eastern market. As yet the only outlets are local markets, but some 20 rigs are active in exploratory and development drilling. Many of the huge surface anticlines are already producing gas. Fracturing has made these tight sands economic and an active drilling campaign is forecast for the next several years.

√ PRODUCTION-RESERVES



Liquid reserves 39.67 billion barrels

DESPITE a 7.4 per cent drop in completions during 1957, a fair net gain in total hydrocarbon reserves was registered. As in 1956, three areas were responsible—West Texas, the Rocky Mountains, and South Louisiana. These provinces continue to come up with flush new discoveries and unexpectedly fruitful field extensions.

The gross addition to reserves of crude oil and natural-gas liquids amounted to 4,040 million barrels; of this, 3,413 million was crude, and 627 million natural-gas liquids. Deducting total production of 2,916 million barrels, the net gain stands at 1,124 million barrels for the year. A further breakdown reveals that 857 million of this was crude, and 267 million natural-gas liquids.

As of January 1, 1958, then, the proved United States reserves of total hydrocarbon liquids are estimated to be 39,669 million barrels. Of this, 33,500 million is crude oil and 6,169 million is natural-gas liquids.

United States oil operators completed 11,739 wildcat exploratory wells during the year, and 1,652 of them opened new fields, oil or gas. This 14.2 per cent total success ratio is a new low for recent years.

As usual, revisions and extensions of older fields were responsible for most of the gain in gross reserves, 3,199 million barrels falling into this category, while only 841 million came from new-field discoveries. Texas nosed out Louisiana during the year as far as the "extension and revision" column was concerned; it added 1,160 million barrels during 1957, to Louisiana's 808 million. As for newly found liquids, the Lone Star State also outstripped all others, with 329 million barrels added to the kitty. Because of its heavier production output, however, Texas trailed Louisiana in net gain, 228 million barrels to 688 million. The next largest gain was scored by Utah, due to heavy exploration and development in the bustling Paradox basin.

Liquid-hydrocarbons reserves

(Millions of barrels)

State—	Jan. 1, 1958	Jan. 1, 1957*	Change
Arkansas	406.1	417.5	—11.4
California	4,415.5	4,516.7	—101.2
Colorado	395.2	404.5	—9.3
Illinois	747.5	765.8	—18.3
Kansas	1,218.0	1,189.6	28.4
Kentucky	161.5	157.2	4.3
Louisiana	5,916.8	5,228.9	687.9
Michigan	77.1	73.0	4.1
Mississippi	471.0	474.0	—3.0
Montana	428.7	430.1	—1.4
New Mexico	1,328.0	1,282.1	45.9
North Dakota	311.0	281.0	30.0
Oklahoma	2,527.8	2,494.6	33.2
Pennsylvania	128.3	135.2	—6.9
Texas	18,677.0	18,448.9	228.1
Utah	347.1	139.1	208.0
West Virginia	76.0	76.7	—0.7
Wyoming	1,618.1	1,645.9	—27.8
Others†	418.7	384.7	34.0
Total United States	**39,669.4**	**38,545.5**	**1,123.9**

*Adjusted. †Alabama, Arizona, Florida, Indiana, Nebraska, New York, and Ohio.

Estimated proved recoverable crude-oil reserves

(Thousands of barrels—primary recovery)

	Proved reserves 1-1-57	1957 discoveries	1957 extensions and revisions	1957 production	Proved reserves As of 1-1-58	Proved reserves Year's change	Proved reserves Per cent of U.S.
Alabama	62,000	0	9,418	5,418	66,000	4,000	0.20
Arkansas	375,000	5,000	16,203	30,203	366,000	— 9,000	1.09
California total	4,205,000	20,000	226,300	339,300	4,112,000	—93,000	12.27
Coastal	905,000	7,000	75,173	85,173	902,000	— 3,000	2.69
Los Angeles	1,190,000	2,000	79,889	108,889	1,163,000	—27,000	3.47
San Joaquin	2,110,000	11,000	71,238	145,238	2,047,000	—63,000	6.11
Colorado	393,000	29,000	16,834	54,834	384,000	— 9,000	1.15
Illinois	749,000	13,000	49,265	78,265	733,000	—16,000	2.19
Indiana	*68,000	2,000	11,727	12,727	69,000	1,000	0.20
Kansas	1,018,000	34,000	119,719	123,719	1,048,000	30,000	3.13
Kentucky	*150,000	4,000	18,792	16,792	156,000	6,000	0.47
Louisiana total	4,214,000	200,000	723,455	295,455	4,842,000	628,000	14.45
North	786,000	12,000	41,031	45,031	794,000	8,000	2.37
South	2,428,000	133,000	414,044	218,044	2,757,000	329,000	8.23
Offshore	1,000,000	55,000	268,380	32,380	1,291,000	291,000	3.85
Michigan	72,000	4,000	9,169	10,169	75,000	3,000	0.22
Mississippi	418,000	18,000	17,660	37,660	416,000	—2,000	1.24
Montana	422,000	11,000	14,133	27,133	420,000	—2,000	1.25
Nebraska	93,000	27,000	25,405	19,405	126,000	33,000	0.38
New Mexico	*868,000	16,000	96,546	92,546	888,000	20,000	2.65
New York	64,200	0	0	2,700	61,500	— 2,700	0.18
North Dakota	281,000	16,000	27,282	13,282	311,000	30,000	0.93
Ohio	*64,000	200	6,270	5,470	65,000	1,000	0.19
Oklahoma	2,139,000	33,000	182,685	213,685	2,141,000	2,000	6.39
Pennsylvania	132,000	0	1,306	8,306	125,000	— 7,000	0.37
Texas total	15,069,000	274,000	839,293	1,055,293	15,127,000	58,000	45.15
East	2,720,000	26,000	61,769	127,769	2,680,000	—40,000	8.00
Gulf Coast	3,188,000	68,000	138,203	200,203	3,194,000	6,000	9.53
North	1,070,000	65,000	149,725	132,725	1,152,000	82,000	3.44
Panhandle	459,000	15,000	97,817	37,817	534,000	75,000	1.59
Southwest	1,354,000	38,000	69,767	98,767	1,363,000	9,000	4.07
West	6,278,000	62,000	322,012	458,012	6,204,000	—74,000	18.52
Utah	139,000	12,000	200,100	4,100	347,000	208,000	1.04
West Virginia	*50,000	0	4,229	2,229	52,000	2,000	0.16
Wyoming	1,592,000	31,000	46,711	106,711	1,563,000	—29,000	4.67
Others†	6,200	200	1,220	620	7,000	800	0.03
Total United States	**32,643,400**	**749,400**	**2,663,722**	**2,556,022**	**33,500,500**	**857,100**	**100.00**

*Adjusted. †Arizona, Florida, Missouri, Nevada, South Dakota, Tennessee, Virginia, and Washington.

Offshore exploration in southern Louisiana waters has continued at a brisk pace, but it no longer is the headline grabber that it once was. This news-leading position has been assumed by the Four Corners-Paradox basin region. The entire Rocky Mountain region, in fact, became the nation's No. 1 place to look for oil, as the percentage of exploratory wells versus total wells rose to a new high, and as a success ratio of better than 12 per cent outstripped the national average. This success catalyst stimulated new records for total drilling in three spots—northwestern New Mexico, Utah, and North Dakota.

Unexpected successes in the Williston basin sent hopes soaring in North Dakota, along with total completions. Mississippian strikes rivaling those in southeastern Saskatchewan were uncovered in Burke, Ward, and Bottineau counties. At the same time, unusual success was met in the southwestern part of the state, and at year's end, in the northwestern corner. All of this Williston activity points to an even greater year in 1958 for North Dakota.

The Paradox basin continued to pop out with new discoveries. The Mississippian here again made news, as Pure Oil Co.'s wildcat success at Big Flat in Grand County, Utah, added that formation to the Four Corners list of prospects. As 1958 came in, Paradox production moved eastward into Colorado, and prospective acreage in the basin gained by the day.

The chart on "giant" oil fields* shows eight new additions to the list during 1957. Most of these came from revisions and extensions in near-giants of the past; the outstanding new one was Aneth field, Utah, a 182-million-barrel newcomer still growing.

While 1957 was far from a record year in oil finding, it was not as bad as some had predicted. But the

*These giant fields with 100 million barrels or more reserves are marked with an asterisk in the tables of production and estimated remaining primary reserves for the larger fields of the United States. These tables appear following this article.

Estimated proved reserves of natural-gas liquids

Includes Condensate, Natural Gasoline, and Liquefied Petroleum Gases

(Thousands of barrels)

	Proved reserves* (1-1-57)	1957 discoveries	1957 extensions and revisions	1957 production	Proved reserves As of 1-1-58	Proved reserves Year's change	Proved reserves Per cent of U. S.
Arkansas	42,467	275	478	3,120	40,100	—2,367	0.6
California	311,728	3,960	19,372	31,550	303,510	—8,218	5.4
Colorado	11,545	114	460	869	11,250	— 295	0.2
Illinois	16,772	3	47	2,322	14,500	—2,272	0.2
Indiana	133		14	22	125	— 8	
Kansas	171,615	390	3,945	5,900	170,050	—1,565	2.7
Kentucky	7,251	9	195	1,930	5,525	—1,726	0.1
Louisiana	1,014,942	20,450	84,408	45,000	1,074,800	59,858	17.5
Michigan	1,068	3	149	120	1,100	32	
Mississippi	56,003	197	2,000	3,200	55,000	—1,003	0.9
Montana	8,145	117	760	272	8,750	605	0.1
Nebraska	6,504	320	320	572	6,572	68	0.1
New Mexico	414,099	686	41,845	16,630	440,000	25,901	7.1
Ohio	1,669	3	128	22	1,778	109	
Oklahoma	355,588	8,400	54,822	32,010	386,800	31,212	6.2
Pennsylvania	3,167	17	245	129	3,300	133	0.1
Texas	3,379,889	55,000	321,211	206,100	3,550,000	170,111	57.4
Utah	95	17	13	5	120	25	
West Virginia	26,741	82	2,147	4,970	24,000	—2,741	0.4
Wyoming	53,874	1,140	4,111	4,025	55,100	1,226	0.9
Others	19,037	503	—1,000	1,040	17,500	—1,537	0.1
Total United States	**5,902,332**	**91,686**	**535,670**	**359,808**	**6,169,880**	**267,548**	**100.0**

*Source: American Gas Association.

decline in net additions to reserves is a red signal to every exploration manager in the U. S. Only an increased wildcatting campaign aimed at opening up new producing provinces similar to the Paradox can arrest this decline in future years. The responsibility for preventing a meeting point between production and new oil found rests squarely with the geologist and geophysicist.

What is the recipe for discharging this responsibility? Persistence would seem to be the chief ingredient. The oil reservoirs in the Paradox basin possess no unique qualities; the key to the jackpot in Utah was persistence, nothing more. The same key must apply to many other potentially productive basins now on the dry or semidry list . . . Black Mesa, Raton, Palo Duro, Desha, South Georgia, Salina, and others.

How "giant" fields compare with all fields (crude oil)

(Millions of barrels)

State—	Number giants	1957 production All fields	1957 production Giant fields	1957 production Giants' per cent	Estimated ultimate All fields	Estimated ultimate Giant fields	Estimated ultimate Giants' per cent	Remaining reserves All fields	Remaining reserves Giant fields	Remaining reserves Giants' per cent
Texas	79	1,055.29	525.20	49.7	38,190	23,243	60.9	15,127	10,313	68.2
California	40	339.30	255.73	75.4	15,241	12,783	83.9	4,112	3,079	74.9
Louisiana	29	295.46	147.55	49.9	9,958	4,365	43.8	4,842	2,195	45.3
Oklahoma	20	213.68	90.63	42.4	9,726	5,158	53.0	2,141	1,030	48.1
Kansas	6	123.72	25.58	20.7	3,960	1,325	33.4	1,048	410	39.1
Illinois	6	78.27	35.91	45.9	2,712	1,473	54.3	733	280	38.2
Wyoming	7	106.71	44.93	42.1	3,106	1,279	41.2	1,563	422	27.0
New Mexico	5	92.55	35.79	38.7	2,090	923	44.2	888	308	34.7
Arkansas	3	30.20	11.78	39.0	1,390	754	54.2	366	123	33.6
Mississippi	3	37.66	8.70	23.1	961	411	42.8	416	166	39.9
Montana	1	27.13	2.59	9.5	697	111	15.9	420	25	5.9
N. Y.-Pa.	2	11.01	9.19	83.5	1,572	887	56.4	186	140	74.9
Colorado	1	54.83	26.15	47.7	836	416	49.8	384	172	44.8
Utah	1	4.10	1.29	31.5	364	182	50.0	347	180	51.9
North Dakota	1	13.28	8.56	64.4	361	250	69.2	311	210	67.5
Other states	0	72.83	0	0	3,297	0	0	616	0	0
Total U. S.	**204**	**2,556.02**	**1,229.58**	**48.1**	**94,461**	**53,560**	**56.6**	**33,500**	**19,053**	**56.9**

Where the nation's oil is stored

ON THESE pages are the estimated proved remaining reserves of crude oil and condensate for the larger fields of the United States. Those major fields with an estimated ultimate recovery of 100 million barrels or more are flagged by asterisks and are included here regardless of present daily production. Fields included all produce 1,000 bbl. or more per day (in Texas, 3,000 bbl.); number of wells includes those producing oil or lease condensate. Figures are in thousands of barrels. Figures under "Acreage" apply to largest reservoir only. All data as of January 1, 1958. Reserves figures refer to primary recovery only.

ARKANSAS

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Atlanta	379	16,950	3,050	37	1,500
Buckner	424	12,970	10,030	44	1,200
Cairo	296	4,893	13,107	25	800
Dorcheat-Macedonia	696	19,228	5,772	78	2,500
El Dorado, East	1,529	18,329	14,671	407	2,500
Falcon	316	1,931	4,069	65	800
Fouke	1,486	15,983	12,017	136	1,800
Horsehead	209	2,342	3,658	34	2,600
Kiblah	602	1,844	4,156	46	750
*Magnolia	4,607	90,985	52,015	106	4,300
McKamie	1,431	20,270	43,730	41	1,800
Midway	2,059	38,198	34,802	46	1,800
*Schuler	2,260	83,276	22,724	166	5,000
*Smackover	4,909	456,790	48,210	1,669	16,000
Stephens	1,689	29,719	15,281	707	4,800
Urbana	1,149	15,622	17,378	412	2,000
Village	770	18,414	5,586	91	3,000
Wesson	2,667	31,639	18,361	185	1,800

APPALACHIAN

*Alleghany	2,027	153,468	30,000		50,000
*Bradford	7,164	593,522	110,000		100,000

CALIFORNIA

Coastal Region					
Aliso Canyon	2,343	29,432	25,568	116	1,100
Bardsdale	507	7,472	6,528	101	350
Casmalia	538	19,428	7,572	61	1,500
Castaic Hills	409	5,667	4,333	55	500
Castaic Junction	1,378	7,463	15,537	48	950
*Cat Canyon, West	4,382	86,417	53,583	285	3,000
Del Valle	605	20,310	7,690	77	650
*Elwood	995	98,240	11,760	40	500
Fillmore	2,244	3,643	16,357	38	800
Gato Ridge	891	24,465	10,535	43	400
Guadalupe	877	4,948	20,052	55	1,000
Honor Rancho	2,642	8,591	18,409	35	600
Lompoc	887	28,915	11,085	99	2,100
Montalvo, West	2,107	6,233	18,767	38	800
Newhall-Potrero	3,200	45,740	34,260	124	1,200
Oak Canyon	398	8,034	4,966	23	300
Oakridge	611	4,682	9,318	40	450
*Orcutt	1,101	119,571	15,429	270	3,650
Oxnard	2,644	10,636	22,364	87	800
Placerita	1,458	28,196	16,804	346	700
Ramona	545	14,452	7,548	123	600
Rincon	3,193	61,980	33,020	275	1,550
*San Ardo	11,862	68,836	116,164	698	4,100
San Miguelito[1]	1,567	41,666	23,334	109	400
*Santa Maria Valley	2,532	126,264	33,736	387	6,400
Saticoy	2,330	3,477	21,523	42	500
*South Mountain	6,577	66,110	58,890	442	2,500
Torrey Canyon	767	11,511	18,489	65	250
*Ventura	21,955	582,930	217,070	1,098	3,350
Zaca Creek	779	11,780	13,220	38	450

(1) Excludes D-7 and D-8 zones carried under Ventura field.

Los Angeles Basin					
Bandini	740	2,135	7,865	52	250
Belmont Offshore	741	1,554	8,446	27	200
Beverly Hills	814	6,262	11,738	17	200
*Brea-Olinda	6,866	257,918	72,082	642	2,400
*Coyote, East	2,188	76,658	23,342	291	1,250
*Coyote, West	2,297	188,498	36,502	326	1,000
*Dominguez	3,970	214,960	45,040	342	1,400
*Huntington Beach	21,514	613,461	211,539	1,791	5,600
*Inglewood	4,667	208,013	51,987	523	1,000
*Long Beach	6,772	805,929	69,071	1,196	1,400
*Montebello	1,449	167,310	15,690	293	1,250
Newport, West	1,497	22,334	17,666	260	1,200
Playa del Rey	567	58,925	6,075	90	450
*Richfield	2,116	131,439	23,561	433	1,450
Rosecrans	1,118	76,633	13,367	216	600
Sansinena	3,659	21,266	43,734	151	900
*Santa Fe Springs	4,440	568,476	51,524	600	1,300
*Seal Beach	4,038	149,726	45,274	275	750
Sunset Beach	758	4,254	7,746	80	250
*Torrance	2,701	148,770	31,230	821	5,000
Whittier	546	24,272	5,728	140	650
*Wilmington	32,371	799,725	228,275	2,900	6,800
Yorba Linda	1,612	6,870	18,130	180	700
San Joaquin Valley					
Antelope Hills	365	7,289	3,711	38	400
Belgian Anticline	3,292	22,164	27,836	150	1,300
Belridge, North	622	64,123	7,877	88	1,900
*Belridge, South	4,045	70,933	44,067	1,184	7,650
*Buena Vista	7,407	463,264	86,736	1,065	15,500
*Coalinga, East	5,436	313,283	61,717	981	7,200
*Coalinga, Nose	16,407	282,911	192,089	104	4,100
*Coalinga, West	2,398	182,931	27,069	891	11,000
*Coles Levee, North[1]	5,046	94,536	55,464	156	3,500
Coles Levee, South	845	17,398	10,602	35	3,300
*Cuyama, South	13,133	102,023	122,977	224	2,800
*Cymric	3,422	66,911	38,089	467	2,600
*Edison	4,147	76,396	43,604	760	6,000
*Elk Hills	5,698	242,089	507,911	284	18,300
*Fruitvale	2,944	71,724	33,276	418	2,800
Gosford, East	374	5,077	4,923	27	400
*Greeley	3,507	77,004	42,996	53	1,900
Guijarral Hills	2,752	31,255	28,745	108	2,500
Helm	981	17,801	10,199	78	4,000
Jacalitos	388	17,369	4,631	102	2,450
*Kern Front	2,299	90,899	24,101	707	4,300
*Kern River	4,997	339,116	50,884	2,919	8,350
*Kettleman North Dome	4,898	417,706	57,294	280	13,100
*Lost Hills	1,705	80,776	19,224	685	3,600
McDonald Anticline	566	3,527	5,743	60	500
*McKittrick	1,022	103,302	13,698	280	1,400
*Midway-Sunset	15,284	843,401	166,599	3,668	26,200
*Mount Poso	2,833	119,204	30,796	443	2,500
Mountain View	1,587	62,639	17,361	230	2,800
Paloma[2]	647	36,025	11,975	55	5,500
Premier	1,620	23,700	16,300	310	2,000
Pyramid Hills	640	4,164	5,836	155	800
Raisin City	1,946	22,176	17,824	138	1,500
*Rio Bravo	4,256	85,955	49,045	95	1,950
Riverdale	539	14,165	5,835	34	1,300
Rosedale Ranch	599	2,869	6,131	40	500
Round Mountain	1,103	47,173	12,827	199	1,300
Russell Ranch	2,935	46,558	38,442	158	1,300
Strand	1,340	8,853	16,147	37	500
Tejon-Grapevine	1,687	15,460	19,540	194	1,800

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
(CALIFORNIA Continued)					
Tejon Hills	587	8,936	7,064	223	900
Ten Sections	1,579	59,813	20,187	107	1,900
Vallecitos	543	629	4,371	11	100
Wheeler Ridge	2,513	16,178	28,822	140	800

(1) Figures do not include condensate. (2) Does not include 707 shut-in producers.

SOUTHEASTERN STATES

ALABAMA					
Citronelle	4,303	6,132	56,868	113	4,500
Gilbertown and East	428	6,836	3,164	64	2,500
Pollard	802	4,454	5,546	36	1,500
MISSISSIPPI					
Baxterville	5,275	61,352	33,648	177	3,400
Bolton	1,177	2,627	17,373	34	1,500
Brookhaven	2,547	45,854	29,146	136	6,000
Church Hill	853	4,317	5,683	32	1,450
*Cranfield	1,203	47,261	52,739	105	7,800
Eucutta	1,424	24,588	15,412	127	5,000
*Heidelberg	3,415	48,466	62,534	210	4,600
Idlewilde	424	1,694	3,306	17	700
Kingston and North	489	4,978	5,022	29	600
LaGrange and South	2,056	31,111	18,889	138	1,300
Mallalieu	867	27,577	12,423	51	2,000
Maxie-Pistol Ridge	1,277	3,425	21,575	140	4,500
Overton	549	2,512	5,488	21	500
Pickens	482	17,772	7,228	36	2,250
Sandersville	413	818	9,182	16	500
Sibley	398	3,372	6,628	29	500
Soso	4,244	13,791	36,209	120	4,500
Sunnyside	361	778	4,222	13	500
*Tinsley	4,134	149,672	50,328	295	9,600
Yellow Creek	1,485	14,158	10,842	139	3,500
FLORIDA					
Sunniland	463	5,279	2,721	11	400

TRI-STATE

ILLINOIS					
Albion	1,313	17,687	17,313	388	5,500
Allendale	589	9,672	5,328	398	8,000
Assumption	423	5,794	2,206	135	2,500
Benton	807	33,968	8,032	237	3,500
Boyd	952	12,369	5,631	110	1,500
*Bridgeport	4,174	265,723	39,277	3,630	30,000
Bungay	497	9,854	6,146	196	3,100
Centralia	2,076	41,656	22,344	560	3,400
*Clay City	8,187	195,943	29,057	3,479	85,000
Cooks Mills	391	1,742	13,258	202	3,500
Dale	2,441	61,101	20,899	1,037	15,250
El Dorado	483	5,497	29,503	162	2,200
Herald	709	9,430	13,570	362	4,500
Inman, East	1,415	14,868	16,132	346	3,300
Inman, West	451	4,344	3,656	204	2,900
Iola	437	9,772	10,228	205	3,000
Johnsonville	1,010	31,521	16,479	373	8,900
Kincaid	1,040	2,286	15,714	62	1,500
*Loudon	11,691	209,547	90,453	2,069	25,000
Mattoon	568	12,802	3,198	429	5,100
Mount Carmel	498	11,416	8,584	375	4,500
*New Harmony	3,462	90,549	14,451	1,795	23,500
Philipstown	547	16,887	8,113	395	5,700
*Robinson (Old)	2,752	174,114	15,886	6,698	37,500
Roland	2,449	33,306	19,694	621	8,600
Sailor Springs[1]	1,552	29,190	12,810	760	13,200
*Salem	5,644	258,082	91,918	2,374	14,400
Sorento, South	425	516	6,484	14	500
Woburn	436	2,894	4,106	86	1,500
Woodlawn	414	14,694	4,306	136	2,000

(1) Sailor Springs includes Sailor Springs, East; Sailor Springs Central consolidated in 1957.

INDIANA					
Griffin	2,009	42,364	17,636	603	6,000
Mount Vernon	473	8,367	3,633	160	1,700
Owensville, East	723	2,421	7,579	76	800
Springfield[1]	568	8,226	5,774	247	2,000
Union-Bowman[2]	1,362	7,589	10,411	495	12,000

(1) Springfield includes Solitude, consolidated in 1957. (2) Union-Bowman includes Kirksville, consolidated in 1957.

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
KENTUCKY					
Apex[1]	784	2,696	8,304	352	3,500
Dixie, West	382	518	4,482	76	800
Hardeson	520	841	9,159	139	1,500
Hitesville	374	9,328	2,672	187	2,500
Poole	916	15,131	7,869	504	5,000
Sebree	512	1,198	3,802	97	1,500
Smith Mills, North	593	3,251	9,749	49	600
Uniontown	478	16,157	4,843	249	4,000

(1) Apex includes High Bluff, consolidated in 1957.

MICHIGAN

Coldwater	807	17,954	7,046	65	3,200
Deep River	574	24,679	13,321	106	1,350
Eden	409	2,286	5,714	37	500
Kawkawlin	581	10,017	4,983	375	7,000
Norwich, East	366	5,408	1,592	97	4,200
Reed City	469	41,115	4,885	160	5,500
Reynolds	749	1,353	3,647	42	600
Rose City	341	3,403	2,597	110	4,500
West Branch	372	8,694	23,306	250	4,600

LOUISIANA

NORTH LOUISIANA					
Bee Brake	359	1,359	3,641	18	1,800
Bellevue	246	15,733	6,267	280	2,000
Benton	783	11,972	6,028	13	2,300
Bethany, South	1,135	2,024	12,986	80	3,200
*Caddo	7,275	238,503	161,497	5,698	75,000
Catahoula, West	745	5,212	8,788	56	1,800
Colquitt	638	2,256	7,744	33	3,000
Cottage Grove	455	1,489	4,511	84	2,000
*Cotton Valley	4,242	92,707	22,293	285	9,600
*Delhi-Big Creek	7,003	94,216	130,784	375	12,000
De Soto	441	65,112	9,888	180	8,000
Esperance Point	1,637	6,535	7,465	56	6,000
*Haynesville[1]	1,797	129,552	25,448	343	13,500
Haynesville, East	1,083	13,389	11,611	135	7,100
*Homer	697	85,114	14,886	320	3,000
Knowles	1,119	10,701	15,299	45	1,800
*Lake St. John	2,585	68,435	46,565	105	11,000
Lisbon	1,115	31,799	30,201	239	14,000
Locust Ridge	1,103	2,051	13,949	24	1,200
Nebo	1,796	41,267	18,733	160	7,000
Olla	1,236	41,021	13,979	150	8,000
Redland	544	830	4,170	45	900
*Rodessa[2]	1,677	122,372	62,628	415	38,000
Rodney Island	663	1,130	3,870	18	900
Ross Bayou	577	2,288	4,712	21	800
Ruston	453	3,978	6,022	34	1,500
Saline Lake	391	4,452	3,548	21	1,900
Shongaloo, North and Red Rock	1,452	2,831	17,169	120	3,000
Sligo	1,561	13,901	14,099	158	4,000
Springhill[1]	366	3,690	4,310	76	2,800
Urania	780	38,263	6,737	314	5,700
Waskom-Greenwood	1,168	5,066	19,934	305	5,000

(1) Includes Arkansas portion. (2) Includes Arkansas and Texas portions.

SOUTH LOUISIANA					
Anse La Butte	2,068	38,434	22,566	125	1,080
Avery Island	3,305	37,765	40,235	95	910
Avondale	520	4,324	6,676	16	500
Bancroft and N. and S.	672	12,650	17,350	29	1,100
Barataria	572	21,795	11,205	24	720
Barataria, West	451	11,382	9,618	16	640
Bateman Lake	2,730	17,981	40,019	58	1,200
Bay de Chene	1,787	11,813	23,187	53	1,900
Bay St. Elaine	3,454	29,989	39,011	102	1,600
Bayou Bleu	1,139	15,156	10,844	81	800
Bayou Choctaw	1,212	11,883	19,117	73	1,220
Bayou Couba	864	7,201	10,799	44	680
Bayou des Allemand	712	9,578	6,422	30	800
Bayou des Glase	494	5,200	4,800	14	540
Bayou Fordoche	450	3,114	10,886	19	1,120
Bayou Mallet and South	866	12,544	15,456	70	2,800
*Bayou Sale	2,737	59,217	42,783	83	4,300
Bayou Sorrel	1,369	2,407	21,593	39	2,000
Bayou White	500	2,996	9,004	19	620

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Belle Isle[1]	1,505	4,599	22,401	27	1,080
Big Bayou Pigeon	436	722	7,278	13	520
Big Lake	827	2,724	9,276	20	1,840
Black Bay, West	748	1,079	28,921	45	1,800
Black Bayou	533	21,959	16,041	27	1,030
Breton Sound, Blk. 20	462	1,814	9,186	11	440
Bosco	496	35,489	10,511	28	2,600
Bully Camp	1,559	11,960	21,040	66	740
Burtville	451	3,509	5,491	13	520
*Caillou Island[1]	11,361	116,916	101,084	284	4,200
Cankton, North	963	10,131	19,869	62	2,400
Chacahoula	1,081	24,725	22,275	61	2,300
Charenton	1,386	28,977	24,023	159	1,800
Clear Creek	731	2,504	31,496	41	2,460
Clovelly	1,208	4,764	19,236	31	760
Cote Blanche Bay, West	1,846	26,244	27,756	69	2,800
Cote Blanche Island	861	2,595	11,405	19	760
Cowpen Creek	702	1,473	22,527	36	1,440
Cox Bay	1,913	17,108	25,892	68	2,240
Crowley, North	1,121	29,304	15,696	39	1,560
David Haas	497	8,307	6,693	21	420
Delacroix Island	751	8,328	6,672	21	980
Delta Duck Club	872	9,607	11,393	30	1,080
*Delta Farms	3,371	74,930	35,070	104	4,160
Delta Farms, West	544	3,347	18,653	20	800
De Quincy	400	4,446	7,554	20	640
Dog Lake	887	15,696	10,304	38	1,100
Duck Lake	2,551	18,866	29,134	81	3,240
Egan	2,233	26,984	12,016	65	2,600
Ellis	690	2,857	14,143	28	1,120
*Erath	3,618	70,420	79,580	62	2,480
Bastian Bay	634	4,621	11,379	24	960
*Bay Marchand, Blk. 2[1]	4,061	22,131	74,869	137	5,480
Fausse Point	1,736	9,723	25,277	56	2,240
Fordoche	693	7,208	14,792	36	1,440
Franklin	826	2,151	11,849	23	920
Garden Island Bay	1,417	27,022	22,978	80	3,200
Gibson and E. and NE.	895	34,290	10,710	58	2,320
Gillis-English Bayou	497	27,440	14,560	39	1,560
*Golden Meadow	3,032	68,047	41,953	241	3,000
Good Hope	1,053	23,038	14,962	36	840
*Grand Bay	4,123	57,923	49,077	136	3,000
Grand Lake	1,141	15,221	14,779	45	1,800
Gueydan and West	996	29,815	12,185	56	2,240
Hackberry, East	852	48,034	19,966	67	1,550
*Hackberry, West	5,161	55,123	78,877	187	1,600
Horseshoe Bayou	814	15,137	17,863	25	1,000
Hurricane Creek	485	5,165	16,835	36	1,440
*Iowa	1,949	85,501	41,499	101	2,000
Jeanerette	1,303	23,627	10,373	53	2,120
*Jennings	895	108,240	23,760	110	1,300
Kent Bayou	615	2,590	8,410	17	680
Kinder	971	2,690	25,310	44	1,760
*Lafitte	3,098	91,740	38,260	94	3,030
Lake Barre	2,051	26,327	17,673	60	2,400
Lake Chicot	958	15,246	7,754	28	840
Lake Mongoulis	648	8,569	12,431	27	1,080
Lake Palourde, East	1,258	2,533	24,467	37	1,480
Lake Pelto	2,826	29,680	28,320	85	3,400
Lake Salvador	1,637	25,801	30,199	42	1,680
Lake Verret, West	1,317	25,981	19,019	56	1,720
*Lake Washington[1]	10,228	31,172	128,828	273	5,460
La Pice	871	12,198	15,802	36	800
La Rose	928	2,628	14,372	21	920
*Leeville	4,119	61,153	48,847	165	3,400
Little Lake	2,468	9,661	45,339	61	2,440
Lockport	954	23,593	22,407	77	1,340
Napoleonville	516	4,881	16,119	34	1,360
New Iberia	858	49,604	8,396	56	2,240
Paradis	2,651	56,772	27,228	78	3,400
Phoenix Lake	1,219	9,959	10,041	45	1,240
Pine Prairie	841	20,258	8,742	70	1,880
Pointe-a-la-Hache	1,666	17,936	20,064	61	2,700
Port Barre	771	28,853	15,147	67	1,560
Potash	523	9,490	5,510	22	880
Main Pass, Blk. 35	3,151	16,528	56,472	73	2,920
Neale	447	15,641	12,359	37	4,000
Krotz Springs	2,259	2,483	24,517	35	1,400
*Quarantine Bay	3,487	56,941	55,059	117	4,060
Raceland	528	11,711	10,289	22	880
Roanoke	504	18,947	7,053	26	1,560
Romere Pass	3,672	26,860	31,140	78	3,780
St. Gabriel	727	25,418	14,582	41	1,640
Section 28 Dome	1,318	13,026	23,974	56	1,690
Shuteston	863	8,215	21,875	48	1,920
Southeast Pass	522	2,030	4,970	14	720
Sunshine	399	5,988	8,012	15	1,320
Sweet Bay Lake	797	1,717	14,283	23	920
Sweet Lake	603	13,480	6,520	24	480
Tepetate	474	19,987	5,013	35	1,400
Tepetate, North	441	9,681	18,319	46	1,840
Tepetate, West	688	17,939	3,061	25	1,000
*Timbalier Bay	8,464	25,805	131,195	249	9,960
University	851	40,550	15,450	50	1,880
Valentine	1,641	16,953	31,047	77	3,080
*Venice	5,456	72,026	60,974	138	1,400
Ville Platte	1,000	56,721	20,279	128	5,600
*Vinton	2,041	88,570	41,430	148	1,560
*Weeks Island	8,628	75,263	66,459	165	3,300
West Bay	4,376	35,932	57,068	148	3,000
White Castle	965	25,292	15,708	41	820
White Lake, East	1,398	19,506	28,494	53	2,120
White Lake, West	743	4,591	11,409	27	1,080
Savoy	516	2,734	13,266	25	1,000
*South Pass, Blk. 24[1]	18,999	52,713	295,287	388	8,000
West Delta, Blk. 53[1]	906	2,673	12,327	15	600

(1) Includes offshore and inland production.

OFFSHORE LOUISIANA					
*Bay Marchand, Blk. 2	3,368	20,360	79,640	119	4,000
Belle Isle	241	1,290	7,710	9	360
Eugene Island					
Blk. 18	783	2,070	12,930	15	640
Blk. 32	686	3,019	13,981	17	680
Blk. 45	244	1,506	4,494	6	240
Blk. 110	84	192	2,808	3	120
Blk. 126	3,220	10,585	54,415	65	2,600
Blk. 128	1,047	2,520	23,480	26	640
Grand Isle					
Blk. 16	804	1,194	18,806	20	360
Blk. 18	2,083	7,533	31,167	39	1,200
Blk. 47	377	458	18,452	19	400
*Main Pass Blk. 69	7,239	23,901	103,099	157	4,200
Ship Shoal Blk. 159	880	1,300	39,700	41	1,080
*South Pass Blk. 24	6,642	23,146	113,854	137	7,480
South Pass Blk. 27	2,166	4,460	44,540	49	2,000
West Delta Blk. 30	2,616	4,262	62,738	67	1,500
West Delta Blk. 53	92	92	11,908	12	480

KANSAS

Barry	564	8,821	5,179	68	1,700
*Bemis-Shutts[1]	5,628	155,383	194,617	1,047	30,000
Bloomer	1,162	48,391	16,609	278	5,600
Boyd	560	8,332	3,668	132	3,900
Browning	1,132	8,997	12,003	101	1,750
Burrton-Haury	668	50,915	6,085	325	11,000
*Chase-Silica[2]	4,578	209,552	50,448	1,350	59,000
Chitwood	417	8,903	4,097	69	2,500
Cooper[3]	1,604	10,739	13,261	241	9,000
Demalorie-Sowder	496	14,883	5,117	142	2,200
Diebolt	829	2,382	8,618	99	2,100
*El Dorado	4,672	232,369	47,631	1,669	22,500
Fairport	1,054	28,798	10,202	237	5,000
Fox Bush	647	21,172	5,828	121	4,500
Garfield	1,724	4,668	17,332	243	8,000
Gates	761	9,311	6,689	151	6,300
Geneseo-Edwards	2,222	60,805	25,195	437	10,600
Gladys	1,832	4,693	26,307	234	4,500
Gorham[4]	1,308	61,999	23,001	435	15,800
*Hall-Gurney	3,580	76,483	30,517	1,247	29,600
Holley	740	1,621	4,379	112	2,500
Iuka-Carmi	1,141	19,237	12,763	243	9,000
Irwin[5]	502	2,296	5,704	74	800
Jelinek	553	4,973	5,027	82	2,700
*Kraft-Prusa[6]	3,238	81,146	38,854	696	27,000
Larned[7]	659	2,742	5,258	76	2,700
Leiker, East	520	1,100	5,900	43	800
Leslie	396	617	4,383	31	600
Lost Springs	556	11,516	3,484	254	8,000
Madison	485	10,608	4,392	119	3,750
Marcotte[8]	2,061	17,345	17,655	345	8,000
Max	414	7,500	3,500	90	1,800
Medicine Lodge-Boggs	438	3,734	2,266	50	2,800
Morel[9]	1,623	23,210	16,790	230	7,500
Mueller[10]	473	7,821	5,179	110	4,600
Murphy	666	4,034	8,966	169	3,000

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
(KANSAS Continued)					
Nichols	812	906	10,094	44	1,000
North Hampton	454	4,028	4,972	55	1,500
Norton	792	3,340	6,660	118	2,200
Ogallah	610	3,625	3,375	79	3,800
Otis-Albert	658	11,891	4,109	199	13,500
Paden[11]	472	3,896	6,104	83	1,800
Ray	1,320	21,091	8,909	157	4,350
Rhodes	1,051	4,496	9,504	150	5,500
Ritz-Canton	1,365	48,237	17,763	356	14,500
Russell	722	16,706	4,294	191	5,300
Sallyards	756	14,455	7,545	178	2,500
Seely-Wick	978	26,139	8,861	293	4,500
Solomon	421	3,772	3,228	98	3,500
Spivey-Grabs[12]	2,027	5,347	24,653	289	16,000
Stoltenberg[13]	1,205	40,770	9,230	316	13,000
Thrall-Agard	599	31,219	10,781	306	3,700
*Trapp[14]	3,883	162,073	47,927	1,234	37,800
Trico[15]	1,272	3,402	15,598	155	3,000
Unger[16]	1,150	1,561	13,439	137	2,600
Welch-Bornholdt	1,024	28,649	10,357	378	9,600
Wherry	442	13,033	4,067	124	2,000
Eastern Kansas Stripper	5,688	237,219	64,781	8,000	

(1) Bemis-Shutts includes Burnett, Burnett, NW., Pleasant Ridge, SW., Walters (Ellis Co.), consolidated in 1957. (2) Chase-Silica includes Workman, Buckbee, Hagan (Barton Co.), Raymond (Rice Co.), consolidated in 1957. (3) Cooper includes Laura, Palco, consolidated in 1957, remainder of Palco included with Marcotte. (4) Gorham includes Cook, consolidated in 1957. (5) Irvin includes Pleasant, North, consolidated in 1957. (6) Kraft-Prusa includes Prusa, NE., consolidated in 1957. (7) Larned includes Larned, SW., consolidated in 1957. (8) Marcotte includes Berland, SW., Marcotte, North and SW., Palco, SE., Tarbach, Nutsch, and Marcotte, consolidated in 1956, and 13 wells of Palco, consolidated in 1956. (9) Morel includes Morel, East, consolidated in 1956. (10) Mueller includes Mueller, West, consolidated in 1957. (11) Paden includes Paden, South, consolidated in Dec. 1956. (12) Spivey-Grabs includes Sunnyview (Harper Co.), consolidated in 1957. (13) Stoltenberg includes Valek, consolidated in 1957. (14) Trapp includes East Trapp, consolidated in 1957. (15) Trico includes Noah, White, SW., Allphin, Allphin, NW., Bassett, Annon, Annon, South, Laura, SE., Spaulding, Marcotte, South, consolidated in Nov. 1956. (16) Unger includes Unger, SW., consolidated in 1957.

OKLAHOMA

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
*Allen	1,608	83,411	16,589	841	8,500
Atlantic	608	8,815	5,185	145	900
*Avant	299	102,766	4,234	563	12,500
Bald Hill	966	55,357	7,643	681	32,000
Beebe	707	29,933	7,067	465	10,000
Bird Creek	419	75,329	5,671	979	31,000
*Bowlegs	655	137,784	12,216	185	5,000
Bradley	3,053	8,753	21,247	171	5,300
Bradley, Northeast	455	1,799	4,201	9	300
*Burbank	14,280	334,020	140,980	2,522	5,000
Cache Creek	721	14,403	3,597	291	3,000
*Cement	4,061	88,571	36,429	1,351	15,000
Ceres, South	646	6,239	3,761	154	1,400
Chickasha	907	3,005	8,995	234	2,500
Clothier, Southwest	428	3,023	5,977	38	600
Cromwell	410	66,718	5,282	185	6,000
Cumberland	1,812	53,080	21,920	139	1,800
*Cushing	2,650	405,474	49,526	1,797	28,000
Davenport	1,289	23,212	10,788	297	3,400
Dill	406	7,377	3,623	69	1,400
Dilworth	677	16,913	16,087	385	9,500
Dora	511	8,647	4,353	127	2,500
Doyle	2,798	22,115	19,885	317	3,500
*Earlsboro	294	134,910	5,090	93	7,500
Edmond	370	26,353	4,647	88	1,000
*Edmond, West	1,292	107,237	22,763	590	32,000
*Elk City	4,078	47,445	72,555	305	7,700
Eola	3,886	16,194	49,806	99	4,000
Falls, Northeast	473	834	5,166	33	750
*Fitts	723	114,135	10,865	449	5,000
Flat Rock	604	45,347	14,653	564	8,000
Garber	849	64,112	8,888	529	6,500
*Glennpool	2,259	256,177	33,823	1,805	24,000
*Golden Trend	17,245	152,977	147,023	1,951	7,700
Guthrie Lake, East	719	1,165	12,835	89	1,500
Hallett	489	2,023	3,977	88	2,800
*Healdton	2,260	229,204	20,796	2,054	9,300
Henderson	383	607	5,393	46	900
*Hewitt	3,240	151,903	33,097	1,443	15,000
Holdenville	628	14,884	13,116	532	6,000
Hoover, North	1,863	14,140	16,860	479	4,500
Iron Post	963	13,041	6,959	400	10,000
Jones	865	6,228	6,772	128	3,500
Knox	1,232	33,419	25,581	403	5,500
Lauderdale	722	18,508	8,492	258	5,000
Lindsay, Northwest	554	1,993	4,007	20	800
*Little River	478	129,156	5,844	152	5,600
Loco	1,542	18,746	16,254	895	8,500
Lucien	817	43,166	8,834	196	5,200
Madill, North	975	1,905	8,095	68	2,500
Mannford	664	11,209	8,791	467	7,500
Moore, Northeast	423	455	4,545	24	500
Moore, West[1]	3,250	12,094	37,906	266	12,000
Mount Vernon	739	3,156	6,844	70	1,200
Mount Vernon, SW.[2]	591	2,223	7,777	121	1,600
Naval Reserve	1,409	29,474	19,526	474	6,500
New England	412	2,980	5,020	118	1,700
*Oklahoma City	3,482	707,440	62,560	556	14,300
Olympic	1,573	34,450	6,550	348	5,000
Osage-Hominy[3]	406	11,968	8,032	176	3,500
Pauls Valley	575	22,928	5,072	79	2,000
Payson	467	5,485	8,515	188	2,300
Peavine	683	6,123	6,877	67	2,000
Pond Creek	403	3,636	3,364	197	3,500
Robberson	796	20,787	9,213	301	6,000
*Seminole	912	162,126	12,874	288	10,750
*Sho-Vel-Tum	29,008	472,886	327,114	6,931	69,000
Slick	665	40,104	7,896	266	8,500
*St. Louis[4]	1,443	186,926	14,074	511	23,000
Stroud	679	23,736	6,264	433	4,500
*Tonkawa	363	126,587	3,413	111	5,500
Walters	417	30,702	3,298	304	4,000
Washington, East	366	2,268	3,732	9	500
Wewoka	485	52,407	5,593	262	2,500
Wildhorse	712	20,350	5,650	421	4,700
Yale-Quay	1,765	40,194	16,806	326	1,000
Northeast Stripper Area	10,588	457,705	117,295	1,234	

(1) Moore, West, includes Short Junction, consolidated in 1957. (2) Mount Vernon, Southwest, includes Mount Vernon, South, consolidated in 1957. (3) Osage-Hominy includes Falls Dome, consolidated in 1957. (4) St. Louis includes Hazel, consolidated in 1957.

NEW MEXICO

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
Allison	432	1,321	5,679	10	500
Anderson Ranch	1,113	4,430	12,570	21	1,900
Arrowhead	509	22,143	7,857	105	5,100
Artesia	789	10,832	9,168	364	11,500
Bagley	1,471	13,836	16,164	33	1,700
Bisti-Gallup	748	1,171	15,829	84	7,000
Bronco	840	3,053	16,947	14	400
Brunson	870	24,863	15,137	110	6,000
*Caprock and East	6,362	27,257	72,743	624	24,000
Caudill Devonian	1,075	3,314	16,686	17	750
Cooper-Jal and Jal Mat	2,172	37,344	52,656	346	18,000
Crossroads	1,307	8,781	16,219	22	520
Dean	1,985	3,314	21,686	28	1,000
*Denton	9,391	56,444	68,556	210	4,500
Dollarhide, West	2,761	15,024	24,976	112	2,900
Drinkard	1,850	44,658	30,342	457	19,000
E-K, Queen	552	1,110	6,890	64	2,400
Echols and North	585	3,394	6,606	9	450
*Eunice-Monument	12,817	292,604	85,396	1,517	60,500
Fowler	922	5,316	9,684	21	1,200
Gladiola	4,529	11,543	38,457	90	3,500
Grayburg-Jackson	845	34,537	14,463	383	15,000
Hare	829	11,463	17,537	81	3,400
*Hobbs	3,495	156,761	39,239	303	12,000
Kemnitz-Wolfcamp	633	638	6,362	27	1,000
King	494	802	4,198	13	500
Knowles and South	877	4,364	10,636	21	800
Langlie-Mattix	1,989	38,409	21,591	721	29,000
Lazy J-Penn	248	2,371	7,629	23	1,400
Loco Hills	496	16,995	8,005	220	10,000
Lovington and East	2,790	28,491	26,509	241	3,600
Maljamar	2,227	35,258	16,742	299	12,500
Mason, North	431	959	5,041	36	1,400
Moore	1,187	5,893	14,107	20	800
Paddock	477	11,500	8,500	102	4,500
Saunders and South	1,534	11,878	16,122	57	2,400
Terry-Blinebry	1,214	3,567	16,433	99	4,000
Townsend Wolfcamp	2,363	9,608	40,392	94	2,800

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
*Vacuum	3,724	81,646	43,354	478	19,000
Verde-Gallup	357	461	3,539	44	3,500
Warren and North	1,007	8,318	11,682	46	1,200
Wilson and N. and W.	335	7,288	4,712	49	2,000
COLORADO					
Adena	5,518	21,849	28,151	124	10,000
Badger Creek	498	3,215	4,785	49	500
Battleship	365	821	4,179	7	150
Beal Creek	505	719	4,281	7	150
Big Beaver	896	2,736	7,264	23	900
Black Hollow	656	2,689	6,311	17	1,000
Bobcat	625	3,197	4,803	31	1,400
Cliff	565	2,452	4,548	30	1,200
Graylin	690	5,837	7,163	56	1,500
Little Beaver Creek	1,331	9,018	13,982	87	1,600
Little Beaver, East[1]	951	2,904	14,096	57	1,800
McCallum, North	422	2,433	3,567	11	600
Mount Hope	566	5,118	9,882	64	1,300
Pierce	754	951	4,049	18	400
Plum Bush Creek	1,062	3,047	6,953	41	1,500
*Rangely	26,154	243,900	172,100	513	19,000
Thornburg	395	677	4,323	15	600
Wilson Creek	2,528	37,134	22,866	39	3,900
Yenter	621	5,797	7,203	29	1,400

(1) Little Beaver, East, includes Kejr, consolidated in 1957.

MONTANA					
Cabin Creek	3,027	5,536	39,464	58	6,000
*Cut Bank	2,587	86,177	24,823	1,224	53,000
Elk Basin		(See Wyoming)			
Glendive	602	3,199	9,801	12	1,000
Ivanhoe	395	679	5,321	11	800
Kevin-Sunburst	909	63,384	8,616	1,383	16,000
Pennel	713	1,081	8,919	23	1,000
Pine Unit	5,468	10,916	33,084	111	8,800
Pondera	567	13,500	7,500	314	4,000
Poplar, East, and McGowan	5,014	16,295	43,705	95	18,000
Sumatra and Northwest	1,299	5,508	14,492	58	2,300
Wolf Springs	551	990	9,010	20	1,500
NORTH DAKOTA					
*Beaver Lodge	8,560	39,729	210,271	5,804	46,000
Blue Buttes	1,242	1,640	34,360	74	6,000
Charlson	1,323	3,676	35,324	81	6,500
NEBRASKA					
Cook	429	1,619	8,381	11	300
Dwight (Baltensberger)	412	651	5,349	22	500
Heidemann	505	505	6,495	15	300
Juelfs	491	900	9,100	30	600
Lodgepole	969	2,545	10,455	51	1,000
Olsen	536	1,892	6,108	34	700
Pottes, Southwest	365	2,766	9,234	45	900
Sloss[1]	3,030	3,602	36,398	80	1,600
Torgeson	399	1,724	4,276	36	750
Travis	841	2,215	4,785	25	500
Vedene	437	950	5,050	22	400

(1) Sloss includes Hafeman, South, Hein, Sloss-State, consolidated in 1957.

UTAH					
*Aneth	1,294	1,791	180,209	100	8,000
Ashley Valley	728	7,998	5,002	30	800
Red Wash	1,544	4,547	54,453	21	12,000
WYOMING					
Ash Creek and South[1]	1,167	4,386	10,614	49	1,800
Beaver Creek	2,146	8,597	31,403	36	1,300
Big Muddy	1,111	40,358	14,642	275	3,000
Big Sand Draw	2,546	26,024	28,976	20	1,000
Bonanza	4,541	23,310	47,690	56	1,200
Burke Ranch	408	1,053	3,947	10	750
Byron	2,235	40,000	20,000	65	2,400
Circle Ridge	721	9,553	10,447	101	700
Clareton	1,598	14,357	23,643	701	30,500
Cole Creek and South	1,018	15,664	9,336	90	4,700
Cottonwood	4,763	6,404	40,596	40	9,000
Crooks Gap	563	8,232	4,768	10	500
Donkey Creek	681	877	4,123	15	500
Dugout Creek	341	2,569	7,431	48	2,000
*Elk Basin[1]	13,793	123,763	176,237	301	5,500
Elk Basin, South	707	6,073	5,927	25	800
Frannie[1]	2,683	43,497	22,503	128	1,600
Garland	4,539	44,784	25,216	115	3,300
Gebo	1,171	9,244	5,756	45	800
Glenrock	3,956	24,980	25,020	210	7,000
Golden Eagle	1,086	5,612	14,388	14	600
*Grass Creek	3,903	63,649	36,351	397	6,000
Grieve	1,771	2,755	22,245	20	1,200
*Hamilton Dome	6,251	50,388	59,612	173	3,000
Happy Springs	918	5,284	9,716	31	300
La Barge	444	14,863	5,137	170	1,000
*Lance Creek	1,150	97,035	22,965	225	2,500
Little Buffalo Basin	1,257	13,087	12,913	31	1,400
*Lost Soldier	4,058	70,922	39,078	65	1,100
Manderson	659	1,894	8,106	30	4,500
Meadow Creek and N.	2,525	16,505	19,495	189	4,500
Murphy Dome	2,508	7,348	27,652	21	160
Mush Creek Area	1,265	23,669	18,331	650	6,000
*Oregon Basin	5,204	82,491	37,509	211	8,300
Pilot Butte	607	7,257	5,743	47	500
Pitchfork	535	2,762	5,238	10	200
Rock River	446	31,550	3,450	30	1,000
Sage Spring Creek	353	4,629	5,371	27	2,000
*Salt Creek	4,478	369,280	50,720	1,290	22,000
Salt Creek, East	1,156	2,223	7,777	8	500
Slick Creek	301	1,232	2,768	8	2,900
Steamboat Butte	3,448	37,346	16,654	45	1,600
Sussex and West	3,283	20,931	26,069	165	5,000
Teapot	753	5,278	4,722	25	3,500
Wertz	2,235	34,495	25,505	30	700
Winkleman Dome	2,595	13,436	29,564	32	900
Worland	333	13,757	9,243	34	6,400

(1) Includes Montana portions of field.

TEXAS

SOUTHWEST TEXAS					
RAILROAD DIST. 1:					
Big Foot	1,630	11,909	33,091	572	10,400
Charlotte	1,035	17,388	19,612	289	6,000
Crown, East (Navarro)	1,232	3,426	19,574	343	8,000
*Darst Creek	2,564	97,061	37,939	546	2,500
*Luling-Branyon	2,081	108,540	28,460	795	4,000
RAILROAD DIST. 4:					
*Agua Dulce	6,786	141,352	83,648	464	10,000
Borregas	3,190	16,771	33,229	193	3,500
Fulton Beach	2,828	19,589	35,411	282	6,500
Hoffman	1,500	31,418	13,582	463	6,500
Kelsey	3,369	36,157	35,843	432	2,800
*La Gloria	3,696	66,871	83,129	192	4,000
Mustang Island	2,243	16,622	23,378	138	1,500
*Plymouth	4,716	99,457	60,543	300	4,000
Portilla	2,967	28,048	61,952	126	1,650
Rincon	2,219	45,522	24,478	253	3,400
*Seeligson (all zones)	8,440	161,419	238,581	905	13,000
Sun	1,289	22,996	17,004	199	2,000
Taft and E., W., S.	1,098	23,244	14,756	125	3,000
Tijerina-Canales-Blucher	2,337	36,451	48,549	222	2,900
*White Point, East	3,737	66,031	43,969	399	5,000
Willamar and West	2,085	40,097	34,903	261	4,000
TEXAS GULF COAST					
RAILROAD DIST. 2:					
Bloomington	1,136	16,201	21,799	113	1,600
Burnell-Tulsita	3,107	33,637	31,363	138	1,800
Francitas, North	1,255	14,722	15,278	62	1,500
*Greta	1,472	73,681	36,319	201	2,800
Helen Gohlke	1,691	14,211	35,789	148	3,000
Lolita	1,359	30,116	13,884	238	3,000
Mary Ellen O'Connor	1,986	6,858	43,142	159	4,500
*Refugio and N. and Fox	1,843	77,987	72,013	213	7,500
*Tom O'Connor	8,604	233,098	216,902	648	7,000
*West Ranch	6,176	109,197	140,803	666	10,800
*Anahuac	5,271	142,618	123,382	304	6,700
*Barber's Hill	1,615	106,378	23,622	164	1,700
Boling and South	1,530	31,387	48,613	185	5,200
*Chocolate Bayou	3,820	60,298	46,702	129	3,300
*Conroe and West	6,412	368,546	231,454	792	11,600
Gillock and E. and S.	2,920	36,809	53,191	190	2,000
*Goose Creek and East	2,708	99,241	37,759	332	4,000
*Hastings	9,374	285,483	214,517	632	5,300
*High Island	3,427	49,489	50,511	163	4,500
Houston, South	1,200	28,848	14,152	88	1,300
*Hull-Merchant	5,278	141,974	105,026	422	14,000
*Humble Dome	1,159	134,173	30,827	341	3,000
*Katy, North	9,652	106,116	88,884	98	3,000
*Liberty, South	4,562	38,804	101,196	390	9,500
*Magnet Withers and E.	1,376	37,680	67,320	224	15,500

Field	1957 Prod.	Cum. Prod.	Est. Res.	No. Wells	Acres
(TEXAS GULF COAST Continued)					
Manvel and Northeast	1,504	57,337	27,663	151	2,500
Markham, North-Bay City, North	1,822	16,958	21,042	88	5,300
*Old Ocean	5,026	102,915	94,085	166	2,500
Orange and North	1,519	43,143	21,857	239	2,500
Oyster Bayou	2,629	41,813	28,187	46	550
*Pierce Junction	7,408	71,923	128,077	400	7,800
Raccoon Bend	1,697	60,883	36,117	199	3,700
Red Fish Reef	1,161	10,963	39,037	66	2,400
Saratoga and West	1,767	42,862	27,138	381	12,000
Sheridan	2,270	23,687	38,313	39	7,000
Silsbee (all fields)	1,746	28,443	21,557	82	3,000
*Sour Lake	1,407	99,145	25,855	278	13,000
*Spindletop	449	134,686	15,314	83	1,000
Stowell	1,537	45,504	24,496	77	4,100
*Thompson (all fields)	8,269	221,423	123,577	338	5,600
Tomball	2,001	59,459	22,541	419	6,500
Village Mills, East	2,203	21,760	28,240	145	1,800
*Webster	9,547	232,164	217,836	209	2,600
*West Columbia and New Withers, North	2,500	125,477	34,523	194	7,000
	1,380	32,900	27,100	148	5,000
EAST TEXAS					
RAILROAD DIST. 5:					
*Powell	284	126,338	3,662	107	2,500
*Van	7,754	273,176	131,824	657	5,900
RAILROAD DIST. 6:					
Carthage	1,336	24,502	20,498	111	38,500
*East Texas	69,067	3,293,758	1,816,242	19,244	135,500
*Hawkins	14,773	226,881	298,119	608	12,500
Haynes	1,413	2,854	22,146	126	4,500
*Neches	3,165	10,174	174,826	270	6,500
New Hope	2,205	26,462	26,538	68	2,000
Quitman	2,196	36,751	23,249	191	5,500
Rodessa		(See North Louisiana)			
Slocum	1,339	1,685	33,315	142	3,000
*Talco	4,179	160,599	69,401	656	9,000
Waskom	1,149	9,179	25,821	146	6,000
NORTH AND WEST CENTRAL TEXAS					
RAILROAD DIST. 7-B:					
Fisher County:					
Claytonville	956	5,173	14,827	50	1,700
Round Top	1,422	15,933	14,067	188	3,500
Nolan County:					
Dora, North	1,231	3,753	21,247	86	2,000
Hylton, Northwest	1,267	4,848	20,152	83	3,000
Nena Lucia	1,788	2,768	37,232	203	8,000
Stonewall County:					
Boyd	1,084	5,774	29,226	62	2,500
Katz	3,054	13,877	36,123	215	8,000
RAILROAD DIST. 9:					
Archer County:					
Holliday	1,205	1,677	23,323	101	2,500
Hull-Silk-Sikes	1,469	51,783	28,217	441	9,000
Clay County:					
Joy	1,014	12,084	22,916	250	5,000
Cooke County:					
Walnut Bend	3,004	46,302	43,698	362	7,000
Grayson County:					
Big Mineral Creek	1,830	7,927	27,073	142	1,500
Sherman and East	3,256	18,615	51,385	325	3,500
Wichita County:					
*Burkburnett	2,317	186,592	67,408	1,343	8,000
*Electra	2,124	180,236	35,764	2,823	14,000
*K.M.A.	4,568	112,303	72,697	1,597	31,000
Wilbarger County:					
Fargo	1,026	14,447	18,553	129	3,500
TEXAS PANHANDLE					
RAILROAD DIST. 10:					
*Badger	3,311	89,238	33,762	1,244	49,000
*Borger-Pantex	3,604	135,458	49,542	1,006	40,000
*Finley	3,943	116,680	62,320	715	28,000
Quinduno	1,412	6,365	21,635	158	5,500
*West Pampa	3,722	122,987	37,013	1,214	48,000
WEST TEXAS					
RAILROAD DIST. 7-C:					
Amacker	1,102	3,392	16,608	29	1,500
Benedum	2,006	24,589	35,411	165	15,000
*Big Lake	692	115,845	6,155	158	6,000
Cree-Sykes (U. Gardner)	1,211	11,612	18,388	155	3,600
Fort Chadbourne	3,650	27,188	32,812	201	15,000
Hulldale	1,601	10,395	29,605	120	4,300
*Jameson	4,375	37,209	62,791	633	17,000
*McCamey	1,959	100,571	39,429	957	20,500
*Pegasus	4,731	36,620	100,380	281	20,000
*Spraberry	12,636	150,872	200,128	2,701	109,000
Todd	1,944	39,052	30,948	97	2,000
Wilshire	1,921	19,509	40,491	45	3,360
RAILROAD DIST. 8:					
Abell	1,213	12,834	27,166	123	2,500
Adair	1,945	19,341	20,659	177	4,500
*Andector	4,179	54,649	55,351	137	5,000
Andrews Penn. and Wolfcamp	2,397	6,600	43,400	57	2,300
Anton-Irish	2,441	24,861	23,139	189	7,400
Arthur (Spraberry)	1,258	1,885	13,115	77	6,000
Bakke	1,328	1,421	28,579	60	2,500
*Block 31	5,793	42,718	77,282	88	6,000
Brahaney	1,160	3,072	26,928	167	7,000
Cedar Lake	1,133	23,826	21,174	185	7,500
*Cogdell	6,428	53,530	81,470	428	15,000
*Cowden, North	5,762	131,198	88,802	883	29,000
*Cowden, South, and (Johnson and Foster)	9,586	148,979	151,021	1,330	30,500
Deep Rock	1,291	6,175	21,825	45	2,500
*Diamond-M	8,629	77,663	117,337	596	18,000
*Dollarhide	3,815	60,299	79,701	320	4,800
Dora Roberts	3,104	6,677	43,323	73	3,000
Dune	1,536	8,216	21,784	286	11,500
Embar	1,999	20,111	29,889	130	5,200
*Emma and (Triple N)	5,429	23,840	76,160	197	8,000
Emperor	1,917	14,221	25,779	308	5,000
Fluvanna	1,594	4,474	30,526	96	3,800
Fort Stockton	1,380	9,721	22,279	323	12,500
Fuhrman-Mascho	4,573	30,393	49,607	631	17,000
*Fullerton and N. and S. Garza	5,022	123,202	121,798	782	26,000
	2,574	32,288	37,712	509	9,000
*Goldsmith	19,831	239,706	230,294	2,630	35,000
Harper	2,226	18,214	35,786	437	8,750
*Headlee	3,558	13,790	86,210	94	3,750
*Hendricks	1,525	228,682	23,318	263	10,500
*Howard-Glasscock	6,487	192,789	94,211	1,502	20,000
Iatan, East Howard	1,727	33,613	17,387	600	10,500
Jo-Mill	4,115	7,959	68,041	193	7,500
*Jordan	3,513	52,179	47,821	413	5,500
*Kelly-Snyder	25,142	192,731	547,269	1,426	52,000
*Kermit	4,107	54,683	65,317	587	17,000
*Keystone	7,028	152,918	151,082	939	11,500
Lea	1,368	5,100	19,900	65	2,000
*Levelland	10,392	103,188	146,812	2,036	84,000
Mabee	1,253	14,016	30,984	125	6,000
Magutex	2,489	8,073	41,927	71	3,500
Martin	2,069	25,916	34,084	163	2,500
*McElroy	10,043	157,851	192,149	1,564	32,000
McFarland	3,888	6,415	53,585	294	11,500
*Means	6,761	38,516	91,484	649	28,000
*Midland Farms	7,523	51,657	58,343	429	18,000
Nolley	1,309	4,935	30,065	76	1,800
Penwell	2,115	42,326	22,674	276	6,000
*Prentice	5,441	24,869	85,131	407	7,500
Reinecke	1,455	16,112	20,888	69	2,800
Revilo	1,213	1,561	33,439	202	8,000
Robertson	1,328	8,227	21,773	149	3,500
*Russell and North	7,208	30,736	99,264	298	6,000
Salt Creek	3,592	24,253	55,747	110	8,400
*Sand Hills	6,791	29,256	100,744	810	15,000
*Seminole	4,290	93,358	86,642	355	13,000
Shafter Lake	3,262	44,697	50,303	489	8,500
Sharon Ridge	2,519	18,643	59,357	1,348	14,000
*Slaughter	10,863	243,651	197,349	2,530	85,000
Snyder	1,572	12,324	28,676	306	11,500
Spraberry		(See District 7-C)			
*TXL	5,780	136,284	138,716	392	7,000
Three Bar	1,357	13,103	13,897	63	3,500
University Block 9	3,531	8,212	56,788	125	4,500
Vealmoor	1,366	13,645	51,355	78	3,200
Vealmoor, East	1,583	15,640	49,360	86	3,600
Virey	2,983	7,343	47,657	76	3,000
Waddell	2,092	23,552	36,448	281	11,000
War-San	1,408	3,772	26,228	35	1,500
*Ward, South	3,963	68,489	56,511	977	12,000
*Ward-Estes, North	10,582	71,976	71,024	1,477	20,000
*Wasson (66 and 72)	14,655	319,003	330,997	1,837	64,000
Welch	1,920	26,295	33,705	340	7,500
Westbrook	2,079	20,767	38,233	413	12,000
Yarbrough and Allen)	1,941	17,548	22,452	77	3,200
*Yates	8,882	449,588	200,412	660	21,000

√ PRODUCTION-RESERVES

Foreign-U. S. gap now million barrels

Venezuela shows greatest production gain

FREE-WORLD crude production gained last year despite easing demand in recent months and the earlier tie-up of Middle East output.

The 3.7 per cent increase was small compared with growth of earlier years. But it still was an addition of more than half-million barrels daily over 1956.

The long-range trend continued to be the gain of foreign crude production in comparison with the United States. It was the third successive year that other areas overtook domestic production. The gap widened to nearly 1,000,000 bbl. daily.

Middle East output was held to less than 1 per cent increase due to crippled Iraq production throughout the year. Iran scored the best gain of any Persian Gulf producer with a net increase of 141,000 bbl.

Venezuela had the best advance of any country, the late-year slump notwithstanding. Operators added a third of a million barrels daily, for a 13.6 per cent increase.

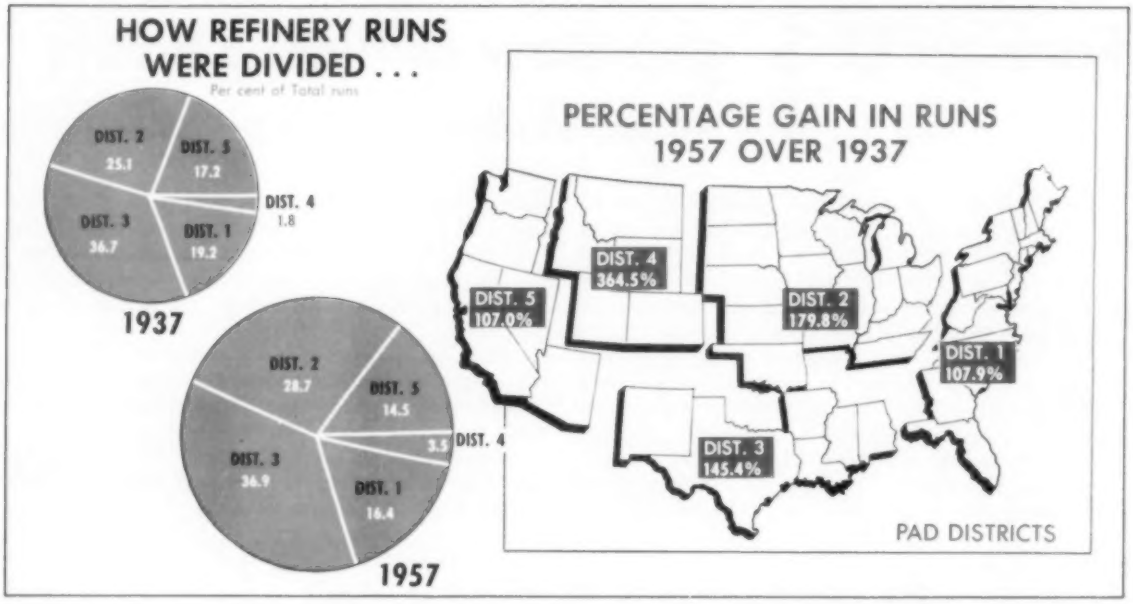
Intensive and expensive exploration programs in other parts of South America, Far East, Africa, and Europe enabled these secondary producing areas to make important gains.

Russia filled its production goal of 1,960,000 bbl. daily with little trouble. It led a total gain in the Communist world of 12.4 per cent.

Foreign crude outstrips U. S. for third straight year

Country—	Production (thou. bbl. daily) 1957	1956	Per cent change	Est. crude-oil reserves (millions of bbl.)	Ref. capacity (thou. of BPSD)
Western Hemisphere:					
Alaska	0	0	0	1.0	0
Argentina	92.6	85.1	8.8	750.0	197.3
Bolivia	9.8	8.7	12.6	70.0	11.7
Brazil	27.4	11.1	147.0	140.0	113.8
Canada	498.0	469.9	6.0	4,000.0	795.0
Chile	11.8	9.7	21.6	40.0	20.0
Colombia	124.7	119.6	4.3	650.0	70.7
Cuba	1.1	1.6	—31.2	3.5	84.2
Ecuador	8.7	9.4	—7.4	25.0	5.6
Mexico	241.0	248.7	—3.1	2,750.0	444.0
N.W.I.	0	0	0	0	650.0
Peru	52.0	50.2	3.6	275.0	49.2
Puerto Rico	0	0	0	0	72.3
Trinidad	93.3	78.9	18.2	300.0	141.0
Uruguay	0	0	0	0	28.0
Venezuela	2,790.0	2,456.8	13.6	16,000.0	755.8
Total	**3,950.4**	**3,549.7**	**11.3**	**25,004.5**	**3,438.6**
Middle East:					
Aden	0	0	0	0	120.0
Bahrain	31.8	30.1	5.6	200.0	211.0
Iran	680.0	539.0	26.1	32,000.0	538.3
Iraq	440.0	637.3	—30.9	25,000.0	55.8
Israel	1.2	0.6	100.0	50.0	85.0
Kuwait	1,120.0	1,087.6	2.8	60,000.0	30.0
Lebanon	0	0	0	0	24.0
Neutral Zone	65.0	32.5	100.0	5,000.0	0
Qatar	136.0	123.3	10.3	1,750.0	0.6
Saudi Arabia	990.0	986.1	0.4	45,000.0	189.0
Southern Arabia	0	0	0	500.0	0
Syria	0	0	0	1.0	0
Total	**3,464.0**	**3,436.5**	**0.8**	**169,501.0**	**1,253.7**
Africa:					
Algeria	0.2	0.6	—66.6	500.0	0
Egypt	44.3	32.7	35.5	275.0	75.0
Morocco	1.5	2.1	—28.6	9.0	2.3
South Africa	0	0	0	0	21.1
West Africa	2.8	0	0	30.0	0
Total	**48.8**	**35.4**	**37.8**	**814.0**	**98.4**

Country—	Production (thou. bbl. daily) 1957	1956	Per cent change	Est. crude-oil reserves (millions of bbl.)	Ref. capacity (thou. of BPSD)
Europe:					
Austria	60.0	66.6	—9.9	350.0	46.9
Belgium	0	0	0	0	162.9
Denmark	0	0	0	0	0.6
Finland	0	0	0	0	18.0
France	27.8	24.2	14.8	150.0	633.6
Greece	0	0	0	0	30.0
West Germany	76.2	68.2	10.5	450.0	357.2
Italy (inc. Sicily)	24.3	11.1	119.0	200.0	580.5
Netherlands	28.6	20.9	36.9	115.0	349.0
Norway	0	0	0	0	1.8
Portugal	0	0	0	0	22.9
Spain	0	0	0	0	132.7
Sweden	0	0	0	0	47.5
Turkey	6.1	5.6	8.9	65.0	6.9
U.K.	1.6	1.4	14.3	7.0	519.3
Yugoslavia	8.1	5.7	42.2	32.0	0
Total	**232.7**	**203.7**	**14.2**	**1,369.0**	**2,909.8**
Asia-Pacific:					
Australia	0	0	0	1.0	207.4
British Borneo	117.8	117.8	0	550.0	50.0
Burma	6.5	5.0	30.0	45.0	6.5
Formosa	0	0	0	0	28.0
India	9.2	7.9	16.5	400.0	98.7
Indonesia	310.0	255.6	21.3	7,500.0	243.8
Japan	6.1	6.1	0	25.0	430.1
New Guinea	6.3	7.2	—12.5	35.0	0
Pakistan	5.8	5.8	0	22.0	6.0
Philippines	0	0	0	0	18.0
Total	**461.7**	**405.4**	**13.9**	**8,578.0**	**1,088.5**
Total non-Communist countries less U. S.	**8,157.6**	**7,360.7**	**6.9**	**205,266.5**	**8,789.0**
United States	**7,168.0**	**7,151.0**	**0.2**	**33,000.0**	**9,570.0**
Total free world	**15,325.6**	**14,781.7**	**3.7**	**238,266.5**	**18,359.0**
Russia and controlled areas	**2,190.0**	**1,948.0**	**12.4**	**26,200.0**	**0**
Total world	**17,515.6**	**16,729.7**	**4.7**	**264,466.5**	**0**



Refiners had to "adjust" in '57

TO THE OWNERS of 304 refineries in 38 states and Puerto Rico, the year 1957 was a period of adjustment to changed conditions in the oil industry over which refiners had little control.

With this background, domestic refiners held their crude runs to stills to an average daily throughput of 7,919,000 bbl. in 1957, a decrease of 28,000 bbl. daily compared to 1956. This was one of the few yearly decreases in domestic refinery operations in the history of the petroleum industry.

It is predicted that domestic crude runs to stills in 1958 will average 8,053,000 bbl. daily, an increase of 1.7 per cent. This expected expansion in the primary operation of refineries is less than the average of recent years but all that appears justified now.

Early January brought higher crude prices to most domestic refiners ranging from 25 to 40 cents per barrel, a development partially caused by the curtailment of Middle East oil supplies in October 1956 because of the shutdown of the Suez Canal.

Refiners had hardly been able to adjust their product prices and operations to the higher crude costs when the Suez crisis ended. Global crude-oil and product movements returned to normal, ending the tight markets that had developed in late 1956 and early 1957 in this country.

Along with the decline in exports, refiners in most areas in 1957 found themselves faced with disappointing domestic demands for the principal products. Instead of a predicted 3 to 4 per cent gain in consumption of products the over-all gain for the year was only 0.2 per cent with some 1957 months running behind the corresponding month of 1956.

Crude Runs to Stills

Of the 13 refining areas in this country, 6 increased their crude runs while 7 had decreases. The largest increase of 67,000 bbl. daily was in the East Coast area followed by a 31,000-bbl. increase for the West Coast states.

The East Coast gains are accounted for by two new refineries coming on stream during the year—the 130,000-bbl. refinery of Tidewater Oil Co. at Delaware City, Del., and the 34,100-bbl. refinery of American Oil Co. (Standard of Indiana) at Yorktown, Va.

The West Coast growth is also explained by the full operating effects of three new refineries completed in the State of Washington in 1956 and 1957. The three plants have a crude-oil capacity of about 100,000 bbl. daily. It is significant that the new plants on both coasts were designed to operate primarily with crudes produced outside the United States.

Lower Realizations

To appreciate what happened last year in domestic refinery operations it is necessary, in addition to demand trends, to be familiar with price developments which resulted in a substantial decline in plant realizations.

After the product price advances in February, following the higher crude-oil schedules, the highest plant realizations per barrel of crude oil throughput for the

year were obtained by most refiners. Then realizations declined steadily at representative plants through November with only a slight improvement in December.

The over-all realization decline in the case of the Gulf Coast refiners from February through November was 32 cents, and 38 cents in the Mid-Continent. These figures are based on the principal products—gasoline, kerosine, distillate, and fuel oil.

Most of the decrease in realization was due to the decline in distillate and fuel-oil prices. This trend reflected in part the increasing competition of natural gas in many consuming areas with reactions in supply and demand which affected all distillate and fuel-oil markets. The net result before the end of the year in effect was that most refiners absorbed all or part of the higher crude costs for the year at their plants.

Higher Octanes

The disappointing price trends didn't stop the necessity of refiners adding to the octane ratings of their motor fuels along with quality improvement in some of the other products. According to Ethyl Corp., the average octane rating of premium fuel increased 1.2 points in 1957 over 1956 and .9 point in regular grade.

In addition, the superpremium third grades which now have ratings from 100 to 102.5 octanes were a factor in refinery operations. Net result was that while refiners as a group were under no compulsion to increase their runs to stills, they did have to expand those operations which contribute to the stepping up of their octane pools. This processing included all types of cracking, reforming, alkylation, coking, and chemical treating. These changes are discussed elsewhere in this issue.

Yields

With continued emphasis on quality rather than quantity, gasoline yields at domestic refineries as an industry in 1957 were about the same as they had been in recent years, despite the increase in cracking and related operations. Increasing octane ratings tends to reduce gasoline yields due to processing losses and this can only be offset by more processing in the production of all types of motor fuels.

In general the yield trend in 1957 in other products was the same as it has been in recent years. Yields of distillates increased with further declines in residual fuel oil and kerosine.

Following is a summary of the domestic crude runs to stills and the production of the principal products in thousands of barrels daily:

	1957	1956
Crude to stills	7,919	7,937
Gasoline	3,873	3,816
Kerosine	295	337
Distillate	1,831	1,819
Residual fuel	1,136	1,166

Minor Products

With the exception of the jet fuels the trend in demand in 1957 for the minor refinery products was similar to that of the major products—either a small gain or a small decrease.

The gain in total demand for jet fuels last year was 12.7 per cent. A report for the first 10 months of 1957 shows that 73 per cent was obtained from gasoline fractions, 20 per cent from kerosine, and 7 per cent from distillate.

The growth in crude-oil refining capacity continued to be much greater in foreign countries as a group than in the United States in 1957 with a 14.5 per cent gain projected for 1958.

Refinery yield trends . . .

	Runs (thou. bbl. daily)	Yields (per cent) Gasoline	Kerosine	Distillate	Residual
1936	2,920	44.1	5.3	11.8	27.0
1937	3,242	43.9	5.5	12.4	26.4
1938	3,192	44.3	5.5	13.0	25.3
1939	3,391	45.0	5.5	13.1	24.7
1940	3,536	43.1	5.7	14.2	24.4
1941	3,861	44.2	5.2	13.4	24.3
1942	3,655	39.8	5.1	14.7	26.9
1943	3,917	37.1	5.0	14.8	29.2
1944	4,551	39.4	4.7	14.4	27.7
1945	4,711	40.9	4.7	14.5	27.3
1946	4,740	39.6	6.0	16.6	24.9
1947	5,075	40.2	6.0	16.8	24.2
1948	5,549	40.3	6.0	18.7	22.9
1949	5,326	43.7	5.2	17.4	21.7
1950	5,739	43.0	5.6	19.0	20.2
1951	6,494	42.4	5.7	20.0	19.7
1952	6,670	43.0	5.4	21.3	18.6
1953	7,000	43.9	4.8	20.7	17.6
1954	6,958	43.8	4.8	21.3	16.4
1955	7,480	44.0	4.3	22.0	15.3
1956	7,937	43.4	4.2	22.9	14.7
1957	**7,919**	**43.7**	**3.7**	**23.1**	**14.3**

. . . and runs by districts in the U. S.

(Thousands of barrels daily)

	1922	1927	1932	1937	1942	1947	1952	1953	1954	1955	1956	1957	% of total 1957	% of total 1922
East Coast	276	412	444	543	441	815	1,029	1,045	1,030	1,065	1,126	1,193	15.1	20.1
Appalachian 1	(*)	(*)	(*)	(*)	105	98	106	109	103	98	101	102	1.3	(*)
Appalachian 2	57	79	93	110	52	68	77	89	83	96	102	94	1.2	4.2
Ill., Ind., Ky.	125	208	292	450	724	826	1,227	1,277	1,276	1,369	1,405	1,382	17.4	9.1
Minn., Wis., Dak.	(†)	(†)	(†)	(†)	(†)	(†)	(†)	(†)	(†)	(†)	86	95	1.2	(†)
Okla., Kans., Mo.	194	279	238	332	354	419	544	589	601	671	685	702	8.9	14.1
Texas Inland	62	95	135	206	187	232	257	256	238	254	272	269	3.4	4.5
Texas Gulf	214	363	402	773	840	1,197	1,599	1,698	1,689	1,841	1,957	1,886	23.8	15.6
Louisiana Gulf	74	136	98	140	147	383	522	550	573	656	696	650	8.2	5.4
Ark., La. Inland	21	57	50	67	79	68	80	86	88	91	94	92	1.2	1.5
New Mexico	(‡)	(‡)	(‡)	(‡)	8	10	18	19	19	21	24	27	0.3	(‡)
Other Rocky Mtn.	67	68	38	64	87	133	222	235	238	255	268	275	3.5	4.9
West Coast	282	573	450	557	631	826	989	1,047	1,020	1,063	1,121	1,152	14.5	20.6
Total United States	**1,372**	**2,270**	**2,240**	**3,242**	**3,655**	**5,075**	**6,670**	**7,000**	**6,958**	**7,480**	**7,937**	**7,919**	**100.0**	**100.0**

*Included in Appalachian 2. †Included in Ill.-Ind. and Okla.-Kans. ‡Included in Rocky Mtn.

Forecast—Still higher octane

Some trends . . .

. . . Refiners are now cat reforming practically all available heavy naphtha. More capacity is needed to handle thermal naphthas. Trend in 1958 will be toward higher reforming severities and lower yields. Combination extractive recycling will gain.

. . . Look for an upsurge in alkylation this year—for motor-fuel blending. Majors are expanding capacity and many independents are adopting this process. Butane isomerization is back in the running, to provide needed alkylation feed stocks.

. . . Pentane and hexane isomerization will get first commercial application in 1958. But don't look for any widespread contracting of new isom units.

. . . Quality competition in middle distillates is promoting hydrodesulfurization. This will sustain the boom in building new hydrogen treating units.

LAST YEAR was one of brisk competition for a disappointing market in refined products. The fight for gallonage that resulted from overcapacity took the form of a continuation of the octane race. This was sparked from within the industry itself, with lesser pressure from high requirement cars in the 1957 line.

On a weighted national average, research octane of premium-grade gasoline rose more than one full number. Regular grade received less emphasis with an over-all gain of about one-half research octane number.

From the standpoint of octane numbers alone, this represented some tapering off in the octane race. But it exerted no less pressure on refiners. As the 100-octane level is approached, each number gets bigger and more costly to attain.

In projecting the progression of octanes this coming year, two bases must be considered: the potential for boosting quality, and the incentive to use these available tools.

Both of these factors favor a continued climb, although it may not amount to a full octane number on premium grade.

On the average, the 1958 compression ratios rose about one-half unit above the weighted average for 1957. But most of this gain was registered in ratios moving up to the 10/1 level. This will tend to promote the trend toward more premium-grade demand at the expense of regular grade.

But the automotive industry has made no concerted frontal attack on top octanes with its new models. There were some new stepouts beyond the 10/1 top of 1957. Three makes now have 10½/1 engines on the road; the two models of the new Edsel, all four models of Mercury, and two optional models in the Pontiac line. In addition, Cadillac moved up from 10/1 to 10.25/1, one Ford engine has been introduced with a 10.2/1 ratio and Pontiac went to 10.1/1 in two models.

The big move was up to 10/1. Altogether, 24 models of 8 makes are now in production at this level, compared with only 7 models of 5 makes last year.

The full picture on actual octane requirements is not yet clear for the 1958 line. Experimental road testing indicates no serious problems on meeting top octanes. But early tests are not always conclusive, since identical engines can range several numbers in antiknock requirements.

Relating top octane requirements to the going average on premium-grade motor fuel does not tell the full story this year. During 1957 the multiple grades came strongly into the picture along the Gulf Coast, East Coast, and inland to much of the Great Lakes and Upper Mississippi areas.

The flurry on multiple grades has since died down, with six major and several independent marketers. No new switches to multiple grade are foreseen this year among majors, but those already marketing superpremium will extend its availability to new areas.

Last year, the introduction of superpremium grades had much the same effect on premium grade that a single intermediate grade has exerted on regular grade in the past. Premium in two-grade companies was boosted in many instances to approach and in some cases even to match the high grades.

This effect will continue in 1958, but possibly the effect will not be as great.

Processing trends . . . Assuming a further boost approaching one full number in premium and something less in regular grade, refiners have recourse to a number of processing combinations to meet this growing problem. No two refiners will follow identical patterns.

In general, however, catalytic reforming will still afford the greatest potential for raising octane ratings this coming year. Total capacity in the U. S. now stands at about 1,500,000 bbl. per stream day. This represents over 15 per cent of crude capacity and takes care of practically all heavy-naphtha feed stocks. Another 100,000 bbl. per day will handle much of the thermal naphtha which can be fed to cat reformers after hydrogen treating.

The greatest potential in boosting octanes by cat reforming has thus been realized. But more remains by various means. Many refiners will increase the severity of their reforming operations to make higher octane product at lower yields.

The level of reforming severity varies widely today, but it is believed to stand roughly at the level giving a yield of 85 per cent. This is merely a mean level, with actual operations ranging widely above and below it.

How far a refiner can go in severity before running into diminishing returns depends on a number of factors, including the type of cat reforming he has. But it is assumed by many, that the average level giving an 80 per cent yield will signal many to adopt other measures.

Alkylation will boom . . . Other refiners will find it more practical to boost their alkylate production, or to initiate alkylation for the first time. The coming year is showing signs of becoming a busy one for alkylation. New capacity has been coming on stream for the past year, designed specifically for motor fuel octane. Last year about 40,000 bbl. per day came on stream.

During 1958, this added increment may well double. Partial returns of The Oil and Gas Journal's current refinery survey indicate that many refiners are adopting alkylation for the first time. Since requirements for avgas are now static at best, this new capacity will be directed solely to making higher motor fuel quality.

Since much of the new capacity is going into plants without existing alkylation facilities, it appears that butylenes will predominate for the olefin feed. Some expansion programs indicate, however, that refiners will go further into alkylation of amylenes and propylene.

This coming year may also signal the trend away from polymerization. In a few instances, alkylation is replacing polymerization operated on butylene feed.

A corollary of alkylation is the isomerization of normal butane to provide added isobutane requirements. A few butane isomerization units are showing up here and there. More will be in the picture before the year is out.

Isomerization still spotty . . . As for isomerization of pentanes and heavier, no swing is looked for this year, or even next year. The octane potential afforded by alkylating C_3, C_4, and even C_5 olefins will probably prove more economic to many refiners before they need the added kick of isomerization. And some observers feel that cat reforming severity will approach 75 per cent yield before isomerization becomes necessary.

Only four isomerization units have been contracted. Three of them, to be completed this year, will go into plants which have available to them more than the normal balance of light hydrocarbons.

Average refiners will adopt isomerization on a large scale in about 3 to 5 years, depending on octane trends, product prices, and other factors.

As presently developed, isomerization itself is a relatively simple step, involving a single-stage fixed-bed reactor. But the major cost item both in investment and operation, is the superfraction required for pretreating feed and splitting isomerate for recycle.

Alkylation, coupled with the eventual prospect of reforming heavy cat gasoline and of isomerizing some light cat reformate, will make superfraction of light ends a major process section in future refineries. The coming year will see further work on centralizing this recovery and fractionation operation in refineries.

By the time isomerization becomes a conventional refining process, it may well show some modifications from its present form. Much research is under way in this direction. Further work is also in the books for the difficult separation of the isomers themselves. Octane ratings of branched-chain hydrocarbons in the pentane to heptane range can vary widely. Refiners would like to see a process which could give them greater specificity for the higher-quality isomers. They would also welcome any new approaches to economic separation. Research work is going forward on both fronts.

Hydrotreating widens base . . . Some refiners felt the pinch of competition on middle distillates this year, and reacted by installing hydrodesulfurization for burning oils and diesel fuels. This is nothing new, but the workhorse hydrogen treating process is rapidly becoming applied to literally every crude fraction except residual. In this respect, 1958 will see more of the same—further construction of hydrogen treating units to process everything from reformer feed stock to waxes and lubes.

In this field, too, technology has a long lead on commercial economics. There are available for license today, four processes for more severe hydrogenation of heavy fractions. But no refiner has taken the step. The realization picture is not yet conducive to this relatively costly method for making distillates from bottoms.

The new year may bring further developments of interest in hydrocracking. But the outlook for plentiful crude supply, plus the firm outlook for heavy fuel oil here and particularly abroad, make hydrogenation of residuals a process for the future.

Radiation processing . . . In this field, commercial application seems even further off into the distant future. The past year saw little in the way of adaptation to refining. This is not to say that research teams are slackening in their efforts. Budgets for radiation research are growing every year.

But the work involved in merely indicating where radiation energy may prove useful in the processing of petroleum is terrifying in its scope. The past year saw many technical papers reporting on various aspects of this basic study. But they dealt with narrow, isolated jabs at the over-all problem. Nothing more spectacular is anticipated during 1958.

Research into this completely new field must start from scratch, learning step by step, just how radiation energy affects the interaction of hydrocarbons. There is a growing feeling, however, that radiation may prove useful in conjunction with catalysis. When irradiated, catalysts undergo changes which affect their active sites.

It is also well known that irradiated catalysts lose these new characteristics rapidly when exposed to normal reactor conditions. Possibly some progress may result from exposing catalysts and reactants to continuous radiation in the catalyst bed.

Journal survey of refinery growth

A

- **Alaska-Yukon Refiners & Distributors, Ltd.,** will complete a $6,000,000, 7,500-bbl. plant at Haines, Alaska, in 1958. It will include a 2,500-bbl. thermal cracker.
- **American Oil Co.** will up capacity of Ultraforming 21,000 bbl. and Hydrofining (Ind.) 22,000 bbl. at Texas City, Tex., in 1958. **Ralph M. Parsons Co.** has contract.
- **American Petrofina Co. of Texas** will increase capacity of Platforming 3,000 bbl. and hydrofluoric acid alkylation 1,400 bbl. at Mount Pleasant, Tex., by October 1958. Cost will be $2,000,000 to $2,500,000. Contractor is **J. F. Pritchard & Co.**
- **Anderson-Prichard Oil Corp.** will add a 2,200-bbl. UOP hydrofluoric acid alkylation unit at Arkansas City, Kans., by November 1, 1958. **The Refinery Engineering Co.** has contract.
- **Atlantic Refining Co.** will complete spring 1958, a 2,100-bbl. alkylation unit at Port Arthur, Tex. **Flour Corp., Ltd.,** has contract.

At Philadelphia, **Badger Manufacturing Co.** will complete an MEK unit in 1959.

- **Atlas Processing Co.** will complete a 3,500-bbl. UOP Penex isomerization unit at Shreveport, La., early 1958.

B

• **Bay Petroleum Corp.** will add a 3,500-bbl. Sinclair-Baker at Denver, Colo. **M. W. Kellogg Co.** will complete unit March 15, 1958.

• **Bay Refining Corp.** will increase crude capacity 12,000 bbl. at Bay City, Mich., in 1959.

• **British American Oil Co., Ltd.,** will complete late 1958, a 20,000-bbl. plant at Port Moody, B. C. **Canadian Kellogg Co., Ltd.,** has contract to build atmospheric and vacuum crude distillation, Orthoflow, Atlantic Catforming, cat cracking, alkylation, and hydrogen-treating units.

• **British Petroleums, Ltd.,** plans a $30,-000,000, 30,000-bbl. plant at Ville d'Anjou, Que., to include a 15,000-bbl. cat cracker, a 9,000-bbl. cat reformer, hydrogen treating, and alkylation.

C

• **California Oil Co.** will complete in 1959, a 10,000-bbl. UOP Unifining-Platforming unit at Perth Amboy, N. J. **H. K. Ferguson Co.** will start construction spring 1958.

• **Cal-Mex Oil & Refining Co.** has let a $27,000,000 contract to **Ralph M. Parsons Co.** for a 20,000-bbl. plant near San Diego, Calif. Plant, to be completed early 1959, will include a cat cracker, cat desulfurizer, cat reformer, and sulfur-recovery unit.

• **Canadian Husky Oil, Ltd.,** has indefinite plans for crude expansion at Lloydminster, Alta.

At Fort William, Ont., a $700,000 crude expansion program including construction of a Husky-developed 1,000-bbl. diesulformer will be completed February 1, 1958, by **Poole-Pritchard, Ltd.**

At Moose Jaw, Sask., crude expansion plans are incomplete.

• **Canadian Oil Companies, Ltd.,** will increase capacity of crude unit 20,000 bbl. and vacuum unit charging topped crude 10,000 bbl. at Corunna, Ont., by mid-1959.

• **Canadian Petrofina, Ltd.,** will up capacity at Montreal 50 per cent to 30,000 bbl. by mid-1958. Cost will be $3,000,000.

• **Carter Oil Co.** will increase crude capacity at Billings, Mont., 8,000 bbl. and vacuum unit charging topped crude 5,000 bbl. by mid-1958, by modifying present facilities.

• **Champlin Oil & Refining Co.** will complete a $2,000,000 1,500-bbl. Phillips hydrofluoric-acid alkylation unit at Enid, Okla., March 1958. **Badger Manufacturing Co.** has contract.

• **Chemoil Corp.** will complete a new 22,000-bbl. plant between New Orleans and Baton Rouge, La., December 1958. It will include a 10,000-bbl. vacuum unit to charge topped crude, a 14,000-bbl. gas-oil cracker, a 5,000-bbl. naphtha reformer, a 9,000-bbl. delayed coker to produce 350 tons of coke per day, a 3,000-bbl. hydrofluoric acid alkylation unit, a 1,000-bbl. cat-poly unit, and a hydrogenation unit.

• **Cit-Con Oil Corp.** will up capacity of vacuum unit charging topped crude 2,000 bbl., and lube production 1,000 bbl. at Lake Charles, La., by March 1, 1958.

• **Cities Service Oil Co., Ltd.,** will complete a $22,000,000, 20,000-bbl. plant at Bronte, Ont., southwest of Toronto, December 1958. **C. F. Braun & Co.** has contract for a 7,600-bbl. vacuum unit to charge topped crude, a 13,300-bbl. UOP fluid cat cracker, and a 3,110-bbl. Sinclair-Baker cat reformer.

• **Cities Service Oil Co. (Pa.)** will complete in 1958, a 14,000-bbl. asphalt plant to replace existing facilities at Linden, N. J.

• **Cities Service Refining Corp.** will increase fluid cat cracking from 135,000 bbl. to 145,000 bbl. (40.9 per cent cycle) by February 1, 1958, and add 4,800 bbl. vapor-phase butane isomerization by June 1, 1958, at Lake Charles, La.

• **Clark Oil & Refining Corp.** will increase crude capacity 5,100 bbl., vacuum unit charging topped crude 13,500 bbl., Platforming 1,000 bbl., and add 2,160-bbl. of straightrun asphalt at Blue Island, Ill., by February 1, 1958. By March 1, 1958, a 1,500-bbl. UOP hydrofluoric acid alkylation unit and an 18,000-bbl. UOP fluid cat cracker (58 per cent recycle) will be added. **Dushell Engineering, Inc.,** engineered the alkylation unit which is being built by **Morrison Construction Co.** The cat cracker is being built by **Procon, Inc.**

• **Commerce Oil Refining Corp.** will complete July 1, 1959, a $48,000,000, 43,-000-bbl. plant at Jamestown, R. I. It will include a 21,500-bbl. vacuum unit to charge topped crude, a 40,900-bbl. fluid cat cracker (50 per cent recycle), a 10,000-bbl. Platformer, a 10,000-bbl. Unifiner, a 2,640-bbl. alkylation unit, 802 bbl. of cat poly capacity, 86 tons of sulfur, and 566 tons of coke. **Lummus Co.** handled some of the original process planning. **Fluor Corp., Ltd.,** has construction contract.

• **Commonwealth Oil Refining Co.** plans a new visbreaker and hydrogen-treating facilities at Guayanilla Bay, Puerto Rico, at a cost of $2,000,000.

• **Consumers' Cooperative Refineries, Ltd.,** will complete a 3,000-bbl. UOP delayed coker to produce 145 tons per day of coke (replacing present thermal cracking capacity) at Regina, Sask., by late 1958. **Fluor Corp of Canada, Ltd.,** is contractor. Cost is $1,300,000.

• **Cooperative Refinery Association** will add a 2,500-bbl. UOP Platformer and a 3,000-bbl. UOP Unifiner at Phillipsburg, Kans., by March 1958, at a cost of $1,250,-000. **Southwestern Engineering Co.** has contract.

At Coffeyville, Kans., **The Refinery Engineering Co.** will complete a 1,200-bbl. UOP hydroflouric acid alkylation unit June 1958, at a cost of over $1,000,000.

At Scottsbluff, Neb., capacity of crude unit will be upped 2,700 bbl. by March 1958, and Platformer 150 bbl. by August 1958.

D

• **Delta Refining Co.** will add a 1,000-bbl. hylrofluoric acid alkylation unit by February 1, 1958, at Memphis, Tenn.

• **Derby Refining Co.** will increase Thermofor capacity 12,000 bbl. (36.6 per cent recycle) at Wichita, Kans., by May 1958. Cat-poly capacity will be upped 600 bbl., straightrun asphalt 2,200 bbl., and oxidized asphalt 220 bbl.

• **Douglas Oil Co. of Calif.** will increase crude capacity to 12,000 bbl. at Paramount, Calif., in 1959.

• **D-X Sunray Oil Co.** will complete a 6,000-bbl. Unifiner at Duncan, Okla., in 1958. **The Refinery Engineering Co.** has contract.

At West Tulsa, Okla., **The Refinery Engineering Co.** will complete a 12,000-bbl. Platformer, a 20,000-bbl. Unifiner, a 3,000-bbl. hydrofluoric acid alkylation unit, and add 2,000 bbl. per day butane-isomerization capacity by April 1958.

E

• **Elk Refining Co.** will increase Platforming 500 bbl. at Falling Rock, W. Va., by January 1, 1958. By March 1, 1958, Unifining will be upped 2,000 bbl.

• **El Paso Natural Gas Products Co.** will complete April 1958, a 6,500-bbl. plant at Odessa, Tex. It will include crude, vacuum, catalytic-cracking, gas-concentration, Platforming, and hydrofluoric acid alklation units.

• **Esso Standard Oil Co.** is installing a 27,000-bbl. Powerformer as part of a $46,-000,000 expansion program at Baton Rouge, La. A 10,000-bbl. Esso sulfuric acid alkylation unit will be completed late 1958 by **Foster Wheeler Corp.** A $750,000, 3,600-bbl. Esso Hydroformer will be completed in 1958, by **Ralph M. Parsons Co.**

At Bayway, N. J., **Foster Wheeler Corp.** has contract for a 15,000-bbl. Hydrofiner.

• **Excelsior Refineries, Ltd.,** plans a $1,500,000, 2,000 to 4,000-bbl. plant at the Pas, West Central Manitoba. Plans are in engineering stage.

F

• **Farmers Union Central Exchange, Inc.,** will complete March 1958, a 4,400-bbl. naphtha Unifiner, a 7,100-bbl. middle-distillate Unifiner, and a 5,100-bbl. Platformer at Laurel, Mont., at a cost of $3,000,000. **The Refinery Engineering Co.** has contract for the three UOP units.

• **Fletcher Oil Co.** will complete a 3,000-bbl. Platformer and a 3,000-bbl. Unifiner at Wilmington, Calif., April 1958.

G

• **Gulf Oil Corp.** will up Platforming capacity 26,000 bbl. at Port Arthur, Tex., by early 1958. **Procon, Inc.,** will complete a 10,000-bbl. pentane isomerization unit (Penex) late 1958.

At Philadelphia, Platforming capacity will be increased 52,000 bbl. in 1958. Engineering and design are by **Universal Oil Products Co.** and **Procon, Inc.**

H

• **Hancock Oil Co.** is increasing crude capacity 7,000 bbl., visbreaking 3,450 bbl., and Thermofor 2,100 bbl. at Signal Hill, Calif. **Ralph M. Parsons Co.** is contractor.

• **Hess Transport & Trading, Inc.,** plans a new plant at Port Reading, N. J.

• **Humble Oil & Refining Co.** will increase fluid cat cracking 55,000 bbl. by April 30, 1958; Hydrofining 6,000 bbl. by May 21, 1958; hydrodesulfurization 50,-000 bbl. by February 1, 1958; cat-poly 1,400 bbl. by July 1, 1958, at Baytown, Tex. **Foster Wheeler Corp.** has contract for cat cracker. **Ralph M. Parsons Co.** has the hydrodesulfurization unit.

I

• **Imperial Oil, Ltd.,** is increasing crude capacity to 18,500 bbl. at Calgary, Alta., as part of a $17,000,000 expansion and modernization program. **Canadian Bechtel, Ltd.,** will complete fall 1959, a cat cracker, Powerformer, atmospheric and vacuum distillation unit, and new treating facilities.

At Ioco, B. C., **Canadian Bechtel, Ltd.,** will increase crude capacity 7,000 bbl. in a $2,250,000 expansion project.

At Winnipeg, Man., **Foster Wheeler Corp.** will complete a 2,850-bbl. Powerformer early in 1958.

• **Irving Oil Co.** plans a plant at St. John, N. B.

K

• **Kerr-McGee Oil Industries, Inc.,** will complete a 5,500-bbl. UOP Unifiner at Wynnewood, Okla., by July 1, 1958, at a cost of $4,000,000. **The Refinery Engineering Co.** has contract.

At Cushing, Okla., **Litwin Engineering Co.** is studying alteration of a crude unit to increase its capacity 7,000 bbl. A cat reformer will be added.

L

• **LaGloria Oil & Gas Co.** (formerly McMurrey Refining Co.) will up Platforming capacity 5,200 bbl., and add a 3,200-bbl. Unifiner at Tyler, Tex., by June 1958. Crude capacity will be increased 6,500 bbl., and fluid cat cracking increased from 10,000

to 15,000 (40 per cent recycle) by September 1, 1958.

• **Leonard Refineries, Inc.,** will complete a $2,600,000, 13,000-bbl. UOP fluid cat cracker (43 per cent recycle) at Alma, Mich., August 1958. In September 1958, an $800,000, 1,000-bbl. UOP hydrofluoric acid alkylation unit will be completed. **Ralph M. Parsons** has contract for both.

• **Lion Oil Co.,** Division of Monsanto Chemical Co., will add by late 1958, a 5,000-bbl. combination hydrogen treater and cat reformer at El Dorado, Ark.

Lion possibly is considering a new plant 20 miles upriver from New Orleans

M

• **McColl-Frontenac Oil Co., Ltd.,** will complete a 10,000-bbl. Texaco Hydrotreater at Montreal East early in 1958. **Foster Wheeler Corp.** has contract.

• **Magnolia Petroleum Co.** will complete a 100,000-bbl. atmospheric distillation unit and a 32,000-bbl. vacuum unit to charge topped crude (both to replace some existing capacities) at Beaumont, Tex., by August 1958. **Foster Wheeler Corp.** has contract for crude unit. A 30,000-bbl. Sovafiner will be completed by **Foster Wheeler Corp.** September 1958. Sulfuric acid-alkylation capacity will be increased 8,000 bbl. by **C. F. Braun & Co.,** by March 1958.

• **Mid-America Refining Co., Inc.,** will add 1,500 bbl. vacuum distillation capacity and 400 bbl. asphalt capacity at Chanute, Kans., by March 15, 1958.

• **Midland Cooperatives, Inc.,** is building a $600,000 lube plant at Fridley, Minn.

N

• **National Cooperative Refinery Association** will expand and modernize its plant at McPherson, Kans. **The Refinery Engineering Co.** has contract to revamp crude, coking, and alkylation units by fall 1958. Crude capacity will be increased 11,000 bbl.

• **North American Petroleum Corp.** has bought site for a new plant at Corpus Christi, Tex. Plans are still in discussion stage.

• **North Star Oil, Ltd.,** plans to add a $1,000,000, 2,700-bbl. Platformer-Unifiner at St. Boniface, Man., by November 1, 1958.

• **Northwestern Refining Co.** will increase crude capacity 17,000 bbl. in 1959, and add a 6,000-bbl. cat reformer and an 8,000-bbl. hydrogenation unit in 1958, at St. Paul Park, Minn.

O

• **Ohio Oil Co.** will increase crude capacity 6,500 bbl., vacuum unit charging topped crude 2,350 bbl., delayed coking 1,000 bbl., fluid cat cracking 850 bbl. (30 per cent recycle), Houdriforming 2,000 bbl., sulfuric acid alkylation 500 bbl., and coke 50 tons per day at Robinson, Ill., by October 1, 1958.

P

• **Pacific Cooperatives** is considering building a 15,000-bbl. plant at Vancouver, Wash. Preliminary plans include a cat cracker, coker, alkylation unit and possibly a cat reformer.

• **Pacific Petroleums, Ltd.,** will build a $500,000, 3,000-bbl. asphalt plant at Dawson Creek, B. C., by May 1958.

• **Pacific Petroleums, Ltd.,** and **Phillips Petroleum Co.** are building at Taylor, B. C., a $15,000,000 plant to include distillation, cat desulfurization and reforming, dehydrogenation, butane isomerization, and alkylation. Pacific will operate plant.

• **Phillips Petroleum Co.** will complete April 1958, a 3,600-bbl. UOP Platformer at Woods Cross, Utah. **Procon, Inc.,** has contract.

At Great Falls, Mont., asphalt capacity will be upped 100 bbl. by spring 1958.

At Okmulgee, Okla., 400 bbl. asphalt capacity will be added by spring 1958.

At Sweeny, Tex., Platforming capacity will be increased 16,000 bbl. by April 1958.

• **Pontiac Refining Corp.** has let contracts to **Fluor Corp., Ltd.,** for redesign and modification of a crude unit, and design and construction of a 5,000-bbl. Unifiner at Corpus Christ, Tex. Cost is $1,500,000.

R

• **Richfield Oil Corp.** plans a new $50,000,000 plant at Everett, Wash., with probable completion set for 1965.

• **R. I. Refining Co.** plans a plant at Tiverton, R. I.

• **R. J. Oil & Refining Co., Inc.,** will increase capacity of crude unit 500 bbl., gas-oil cracking 200 bbl., Platforming 950 bbl., and add a 1,700-bbl. Unifiner at Princeton, Ind., by January 1, 1959.

• **Rothschild Oil Co.** is adding an 8,000-bbl. cat cracker at Santa Fe Springs, Calif., at a cost of $2,000,000. **C. F. Braun & Co.** is contractor.

• **Royalite Oil Co., Ltd.,** will complete in 1960 a $50,000,000, 20,000-bbl. separation plant to process Athabasca oil sands at Mildred Lake, Alta. **Caribou Engineering Co.** has contract.

S

• **Seminole Oil Co.** has indefinite, long-range plans for a $16,000,000, 15,000-bbl. plant at Fort Pierce, Fla., to be operated by Frontier Refining Co.

• **Shell Oil Co.** will complete mid-1958, a multimillion dollar, 2,400-bbl. sulfuric acid alkylation unit at Anacortes, Wash. **Fluor Corp., Ltd.,** has contract.

At Willmington, Calif., a 16,000-bbl. Platformer will be completed by **Kaiser Engineers** early in 1958.

At Norco, La., a 16,000-bbl. UOP Platformer-Unifiner will be completed summer 1958 by **Procon, Inc. Foster Wheeler Corp.** and **J. F. Pritchard Co.** will build auxiliary facilities.

• **Shell Oil Co. of Canada, Ltd.,** will add a $3,000,000, 1,500-bbl. hydrofluoric acid alkylation unit at Montreal East by May 1958. **Refinery Engineering, Ltd.,** is contractor.

At Bronte, Ont., near Toronto, a 20,000-bbl. plant will be completed in 1960.

• **Sinclair Refining Co.** will add a 1,200-bbl. Texaco MEK dewaxing and deoiling unit at East Chicago by October 1958. **Badger Manufacturing Co.** has contract.

• **Sioux Oil Co.** will up crude capacity 1,000 bbl., gas-oil cracking 1,000 bbl., and cat-poly 50 bbl. at Newcastle, Wyo., by April 1, 1958.

• **Skelly Oil Co.** will complete a 3,500-bbl. Phillips hydrofluoric acid alkylation unit at El Dorado, Kans., spring 1958. Engineering and construction are by Skelly personnel.

• **Socony Mobil Oil Co., Inc.,** will complete early 1959, a 19,000-bbl. delayed coker at Paulsboro, N. J. **Lummus Co.** is contractor.

• **Southland Co.** has bought site at Black Point, Fla., for a proposed $8,000,000, 15,000-bbl. plant.

• **Standard Oil Co. of California** will build a $75,000,000, 60,000-bbl. plant at Mukilteo, a suburb of Everett, Wash.

At Bakersfield, Calif., a 5,500-bbl. cat reformer will be completed mid-1958 by **Bechtel Corp.**

At Richmond, Calif., a 22,000-bbl. cat reformer will be completed mid-1958 by **Bechtel Corp.**

At Barbers Point, Oahu Island, Hawaii, site has been selected for a proposed plant.

• **Standard Oil Co. (Ind.)** will increase capacity of Ultraforming 21,000 bbl., and Hydrofining 21,000 bbl. at Whiting, Ind., by April 1958. **Ralph M. Parsons Co.** has contract. **Arthur G. McKee & Co.** will complete in 1959, a 140,000-bbl. crude distillation unit, the world's largest, to replace several smaller units.

At Wood River, Ill., **Arthur G. McKee & Co.** will complete in 1959, a 67,500-bbl. crude distillation unit and a 30,000-bbl. fluid cat cracker to replace present units and increase plant capacity 30 per cent.

At Mandan, N. D., a 1,630-bbl. Phillips hydrofluoric acid alkylation unit will be completed September 1958, by **Foster Wheeler Corp.**

At Neodesha, Kans., **Foster Wheeler Corp.** will complete early 1958, a 6,000-bbl. Ultraformer (Ind.).

• **Standard Oil Co. (Ohio)** will complete a $2,400,000, 3,500-bbl. sulfuric acid alkylation unit at Cleveland, May 1, 1958. **Arthur G. McKee & Co.** is prime contractor. Auxiliary facilities will cost $1,000,000.

At Toledo, work is under way to replace present crude, thermal and poly units. Crude capacity will be 60,000 bbl., vacuum unit charging topped crude 23,000 bbl., poly 1,650 bbl., and delayed coking 8,000 bbl. to produce 350 tons per day of coke. Units being added include a 55,000-bbl. fluid cat cracker (45 per cent recycle), a 12,000-bbl. Sinclair-Baker cat reformer, and a 22,500-bbl. Kellogg Hydrofiner. **M. W. Kellogg Co.** will complete the $40,000,000 project mid-1958.

• **Standard Oil Co. of Texas** will increase crude capacity 28,000 bbl., vacuum unit charging topped crude 13,200 bbl., add a 13,500-bbl. fluid cat cracker and a 2,025-bbl. cat-poly unit at El Paso, Tex., by February 1958. **Fluor Corp., Ltd.,** has contract for cat cracker.

• **Sun Oil Co.** will complete a 50,000-bbl. expansion of crude cracking and distillation facilities at Marcus Hook, Pa., in 1958. **Catalytic Construction Co.** is engineering the project.

• **Sunshine State Refineries, Ltd.,** plans to complete late 1959 or early 1960, a 25,000-bbl. plant at Plant City, Fla. It will include a 5,000-bbl. Platformer, a 10,000-bbl. Unifiner, Thermofor, and alkylation. **Kaiser Engineers** has design.

T

• **The Texas Co.** will complete a 40,000-bbl. plant at Anacortes, Wash., by January 1, 1959. It will include a 25,000-bbl. fluid cat cracker, a 7,000-bbl. Platformer, cat polymerization, sulfuric acid alkylation, and Hydrotreating. General construction is by **Bechtel Corp.** Furnishing and erection of tankage is by **Chicago Bridge & Iron Co.**

• **Tidewater Oil Co.** will complete a 22,500-bbl. Houdriformer at Avon, Calif., March 1958. **Bechtel Corp.** has contract.

U

• **Utah Oil Refining Co.** will up capacity 5,200 bbl. at Salt Lake City, Utah, by mid-1958. **Fluor Corp., Ltd.,** has a $2,125,000 contract for a 35,700-bbl. pipe still to replace present facilities.

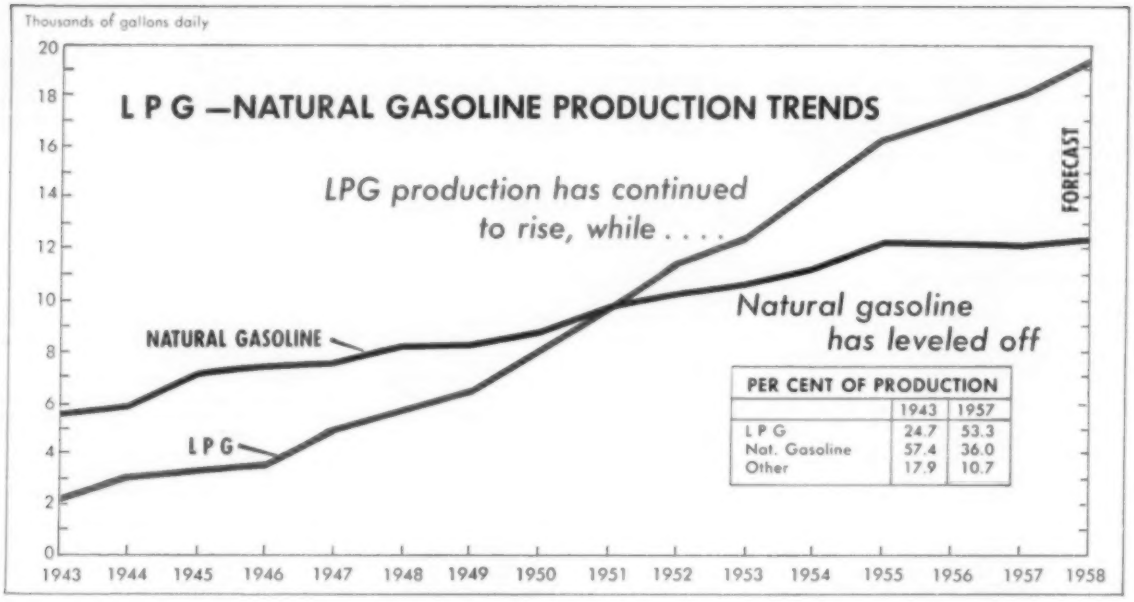
W

• **Wainwright Producers & Refiners, Ltd.,** has let contract to **Ralph M. Parsons Co.** for a 3,000-bbl. thermal cracker and a 1,000-bbl. Platformer at Wainwright, Alta.

• **Western States Refining Co.** will increase crude capacity to 5,000 bbl. at North Salt Lake, Utah, by May 1, 1958.

• **Westland Oil Co.** will increase Platforming capacity 600 bbl. at Williston, N. D., by May 1958.

• **Wilshire Oil Co. of California** will complete in 1958, a 3,000-bbl. alkylation unit, and add 2,500 bbl. butane isomerization at Norwalk, Calif.


Thousands of gallons daily
L P G —NATURAL GASOLINE PRODUCTION TRENDS
LPG production has continued to rise, while . . . .
Natural gasoline has leveled off
FORECAST
NATURAL GASOLINE
L P G
PER CENT OF PRODUCTION
1943 1957
L P G 24.7 53.3
Nat. Gasoline 57.4 36.0
Other 17.9 10.7
0 2 4 6 8 10 12 14 16 18 20
1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958

Gas-liquids output hits a new high

WIDENING MARKETS for products, additional processing applications, and the greater use of pipeline, barge, and tanker transportation, all contributed to a healthier operating situation in the production of natural-gas liquids in 1957.

A total of 541 field processing plants—487 natural gasoline and 54 cycling—scattered throughout the domestic oil country had a processing capacity of 37,578,634 gal. (900,000 bbl.) of natural-gas liquids daily in early 1957.

The output of all plants last year averaged 33,787,000 gal. daily, a record yearly total, representing a gain of 2.4 per cent over 1956. A further increase is in prospect in 1958 with a predicted output of 35,270,000 gal. daily, a gain of 4.4 per cent over 1957.

Texas plants accounted for 55.5 per cent of the 1957 output. The first five states—Texas, California, Louisiana, Oklahoma, and New Mexico—in that order —are credited with 88 per cent of the national total for last year.

Liquefied petroleum gas, which in the early history of the natural-gasoline industry was largely a waste product, was responsible for 53.3 per cent of the marketed natural-gas-liquid production last year. Natural gasoline was 36.1 per cent, while the remaining output, classified as "other" was 10.6 per cent.

Changes in Products

Part of the gain in LPG output can be attributed to a trend toward sale of lower-vapor-pressure natural gasoline. This development in effect means less butane in the natural-gasoline products and the surplus butane is thus added to the production of LPG. Most observers feel that this trend will become more marked in 1958 and later.

These adjustments reflect changes in manufacturing methods and sales demand. The lower-vapor-pressure grades are often more salable in blending with refinery-gasoline fractions in the production of finished motor fuels. There is also the fact that heavier fractions of natural gasoline can now be catalytically reformed either alone or blended with heavier refinery-gasoline fractions. This operation improves the octane rating of the lower-vapor-pressure material of natural-gas liquids and this widens its use in the production of motor fuels.

There are other developments in processing applications which tend to strengthen the market for natural-gas liquids. These include the isomerization and alkylation of butane and pentane at refineries to obtain high-octane material.

Liquefied Petroleum Gases

Most of the existing markets for LPG are expanding and new outlets were a factor in 1957 expansion.

House heating with propane or butane, or a combination of the two, which is the most important LPG market, continues to grow steadily and that trend will continue through 1958 and later years. It is being supplemented with the greater use of LPG in air conditioning.

The light liquids are more and more a factor in the production of petrochemicals, particularly polyethylene, and the components used in the production of synthetic rubber.

PRODUCT OUTPUT AT NATURAL-GASOLINE AND CYCLING PLANTS—1957*
(Thousands of gallons daily)

	LPG	Natural gasoline	Other	Total	Per cent increase
Appalachian	469	100	2	571	
Kentucky	511	96		607	—3.0
Ill.-Mich.	985	69	5	1,059	4.5
Kansas	287	312	1	600	11.7
Oklahoma	1,602	1,274	10	2,886	—2.4
Nebraska†	154	56		210	—3.0
Arkansas	148	104	9	261	—3.0
Louisiana	878	624	1,422	2,924	—2.8
Gulf	421	512	634	1,567	—1.0
Inland	457	112	788	1,357	—4.7
Mississippi	27	46	30	103	6.2
New Mexico	986	798	24	1,808	11.8
Texas	10,544	6,251	1,943	18,738	4.0
Texas Gulf	2,358	1,315	704	4,377	8.0
West Texas	3,164	3,051	8	6,223	11.2
East Texas	638	361	15	1,014	—7.1
Panhandle	2,449	268	13	2,730	
Other Texas	1,735	1,256	1,203	4,394	—3.3
Rocky Mountain	358	267	9	634	7.8
California	1,076	2,167	143	3,386	—3.7
Total U. S.	18,025	12,164	3,598	33,787	2.4

*Ten months actual, 2 months estimated. †Includes North Dakota.

TOTAL PLANT PRODUCTION BY YEARS
(Thousands of gallons daily)

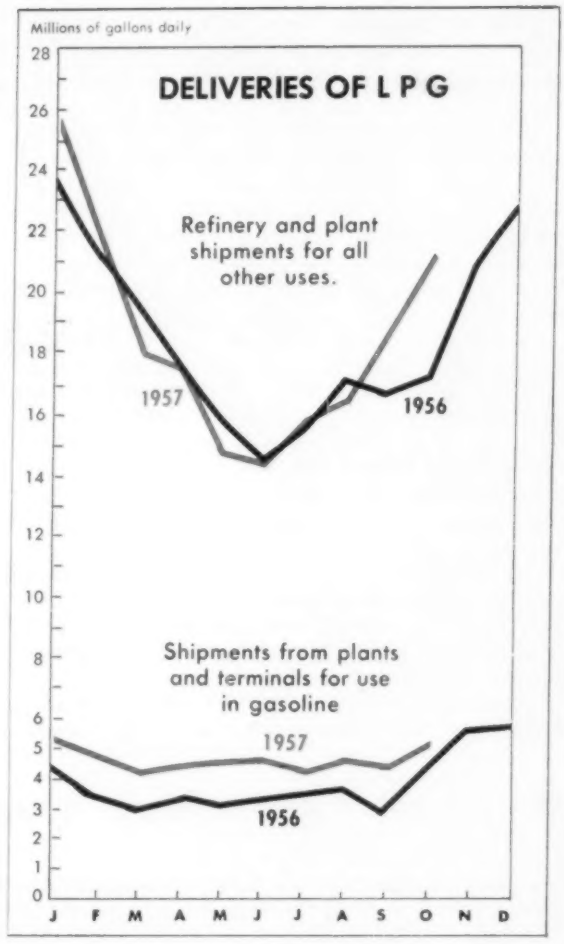
	1952	1953	1954	1955	1956	*1957
Appalachian	689	559	521	899	571	571
Ill., Mich.	325	466	929	961	1,013	1,059
Kentucky	511	580	520	614	626	607
Kansas	525	592	567	580	537	600
Oklahoma	2,134	2,323	2,553	2,784	2,957	2,886
Nebraska	(†)	(†)	(†)	130	197	210
Arkansas	302	311	298	286	269	261
Louisiana	2,650	2,612	2,621	2,940	3,007	2,924
Gulf	1,096	1,155	1,130	1,386	1,583	1,567
Inland	1,554	1,457	1,491	1,554	1,424	1,357
Mississippi	143	138	118	97	97	103
New Mexico	760	802	1,235	1,478	1,617	1,808
Texas	13,789	15,145	15,662	17,640	18,014	18,738
Texas Gulf	3,146	3,209	3,587	3,885	4,053	4,377
West Texas	3,112	4,242	4,612	5,737	5,594	6,223
East Texas	1,390	1,348	1,214	1,197	1,092	1,014
Panhandle	2,176	2,335	2,070	2,591	2,730	2,730
Other Texas	3,965	4,011	4,179	4,230	4,545	4,394
Rocky Mountain	361	340	374	433	588	634
California	3,456	3,583	3,616	3,536	3,515	3,386
Total U. S.	25,645	27,451	29,014	32,378	33,008	33,787

*Ten months actual, 2 months estimated. Included with Kansas.

PRODUCT OUTPUT BY YEARS
(Thousands of gallons daily)

	LPG	Natural gasoline	Other	Total	Per cent incr. Total	Per cent incr. LPG
1943	2,495	5,796	1,802	10,093	5.3	17.6
1944	3,196	5,981	2,302	11,479	13.7	28.1
1945	‡3,562	‡7,157	2,171	12,890	12.3	11.4
1946	3,763	7,472	2,083	13,318	3.3	5.7
1947	5,074	7,627	2,507	15,208	14.2	34.8
1948	5,880	8,295	2,659	16,834	10.7	15.9
1949	6,518	8,388	3,171	18,077	7.4	10.9
1950	8,198	8,963	3,780	20,941	15.8	25.8
1951	9,761	9,832	3,969	23,562	12.5	19.1
1952	11,445	10,277	3,923	25,645	8.8	17.2
1953	12,659	10,769	4,023	27,451	7.0	10.6
1954	14,259	11,248	3,507	29,014	5.7	12.6
1955	16,363	12,214	3,801	32,378	11.6	14.8
1956	17,212	12,214	3,582	33,008	1.9	5.2
1957*	18,025	12,164	3,598	33,787	2.4	4.7
1958†	19,280	12,220	3,770	35,270	4.4	6.9

*Ten months actual, two months estimated. †Forecast. ‡Isopentane included in natural gasoline, starting with 1955.



Reports also show that the use of LPG in motor fuels for farm and industrial tractors, drilling rigs, irrigation and other types of pumping, trucks, and cars expanded in 1957 and further growth appears assured.

Transportation

The past year brought a substantial expansion in the transportation of natural gasolines and LPG by pipelines, tankers, and barges. In the case of pipelines separate lines between plants and refineries and shipping terminals have been placed in operation and in some cases product lines which also transport refinery products, have been used. Transportation of natural gasoline, particularly the low-vapor-pressure grades, with crude oil in pipelines, is becoming more important in the operation of the natural-gas-liquid industry.

These pipeline and water-transportation operations tend to reduce the costs of the finished products to refiners, jobbers, and other buyers and thus widen market outlets. The greater use of underground storage of natural-gas liquids to span the seasonal consumption of several products is also pointed to as one of the constructive developments which assure better days for the light products of petroleum, long termed the "weak sister" in oil markets.

With the foregoing current background, those familiar with conditions see two major continuing trends in the manufacture and utilization of natural-gas liquids.

The emphasis on further processing, involving large capital outlays, strengthens the position of plants of large capacity. This assumes fields and areas where large plants are feasible from the standpoint of processing-gas availability either from crude oil or gas wells. Location as to markets and transportation is also a factor in deciding whether plants of large capacity are justified.

Assuming favorable conditions, it is predicted that manufacturing facilities at the larger plants will be expanded to include catalytic reforming and possibly isomerization alone or in combination with alkylation. This type of operation places stress on the latest developments in fractionation to assure close control of natural gasoline and LPG specifications. This includes the securing of separate hydrocarbons for which there are special demands.

In cycling operations the facilities could include the catalytic or thermal cracking of the distillate yield. Where feasible a central operation at one plant could draw on plants in the same general area for components suitable for further processing.

Such a plant could supply high-octane aviation or motor fuels or fractions which would be valuable marketwise in blending for finished products at refineries or terminals. Petrochemical plants are now also an important outlet for separate hydrocarbons.

These plants would be in a position to carry on the conventional operations designed to supply customers with the usual grades of natural gasoline and LPG.

Refinery Competition

Competitive with this type of operation will be situations in which natural-gasoline-plant operations will not include the special processing. In these cases the practice will be to move grades of widely varying specifications to refineries.

This will usually be done by pipeline or water transportation with tank cars or tank trucks used for short hauls. In this type of operation the extra processing will be done at the refineries.

There are installations at refineries in which the crude stills incorporate whatever equipment is necessary to completely fractionate not only the crude oil but also the output of gasoline plants.

These operations at present assure attractive delivered costs at the refineries. The various products and individual hydrocarbons are often desirable for blending with refinery products. Many refineries also have the facilities for further processing of the light fractions of the gasoline plants. They thus help round out a complete manufacturing operation at refineries.

Where plant expansion is under way or planned

A

• **Anchor Gasoline Corp.** is expanding capacity from 25 to 40 M.M.c.f.d. at its East Krotz Springs, La., plant.

• **Arkansas Louisiana Gas Co.** plans to build a $3,000,000 hydrocarbon extraction plant at Magnolia, Ark., by mid-1959. It will extract 78,000 gal. of ethane daily.

B

• **Bass, Harry, & Sons, Inc.,** plans a $2,000,000 100-M.M.c.f.d. plant in Pembina field, Alberta. It will produce 200,000 gal. of liquid products daily. Completion is set for late 1958 or early 1959. Plant will be operated by Goliad, Ltd., a subsidiary of Bass.

• **Brazos River Gas Co.** plans to expand capacity to 30 M.M.c.f.d. at Mineral Wells, Tex., by March 1958.

• **British American Oil Co., Ltd.,** will expand capacity 180 M.M.c.f.d. at Pincher Creek, Alta.

G

• **Ginther, Warren & Ginther** plan a plant south of Fort Morgan, Colo.

• **Gulf Oil Corp.** will expand capacity 60 M.M.c.f.d. at its Waddell plant near Crane, Tex., in 1958, at a cost of $8,000,000. **Fluor Corp., Ltd,** has contract.

H

• **Humble Oil & Refining Co.** will build the world's largest cycling plant in Kleberg County, Texas, 15 miles south of Kingsville. Capacity will be 750 M.M.c.f.d. and 25,000 bbl. daily of liquid products will be recovered. Construction will start midsummer 1958, with completion set for mid-1960.

I

• **Imperial Oil, Ltd.,** has under way a $750,000, 3-M.M.c.f.d. plant in the Smiley-Coleville area 120 miles southwest of Saskatoon, Sask. **Brown & Root, Ltd.,** is contractor.

K

• **Kansas-Nebraska Gas Co., Inc.,** will build a million-dollar, 35-M.M.c.f.d. plant at Big Springs field in southwestern Nebraska, to turn out 25,000 gal. of propane, 8,000 gal. of butane, and 6,000 gal. of natural gasoline daily.

• **Kentucky West Virginia Gas Co.** is building a 50-M.M.c.f.d. plant at Maytown, Floyd County, Kentucky. **J. H. Jimison & Son** of Huntington, W. Va., has contract.

L

• **Loffland & Allison Gas Co.** (J. M. Loffland Co. and B. F. Allison Drilling Co.) will complete a $400,000, 8-M.M.c.f.d. plant 4 miles south of Fort Morgan, Colo., January 1958. **Green Brothers** of Fort Morgan has contract.

P

• **Pure Oil Co.** will increase capacity from 20 to 25 M.M.c.f.d. at its Adena field, Colorado, plant by late February 1958.

R

• **Russell Engineering Corp.** will build and operate a 2.4-M.M.c.f.d. plant in Vallery field east of Fort Morgan, Colo.

S

• **Sinclair Oil & Gas Co.** is expanding capacity to 9 M.M.c.f.d. at its gas products plant 27 near Sweetwater, Tex.

• **Sioux Oil Co.** is building a $100,000, 4-M.M.c.f.d. plant at Newcastle, Wyo.

• **Steelman Gas, Ltd.,** will complete a $20,000,000 plant northeast of Estevan, Sask., by September 1958.

• **Sun Oil Co., et al.** (Pan American Petroleum Corp., Sinclair Oil & Gas Co., Cities Service Oil Co., Shell Oil Co., Union Oil Co., Oklahoma Natural Gas Co., Kerr-McGee Oil Industries, Inc., Anderson-Prichard Oil Corp.) will build a plant at Laverne field, Oklahoma, by spring 1959. Capacity will be 100 M.M.c.f.d. and 100,000 gal. daily of liquids will be produced. Sun Oil will operate plant.

T

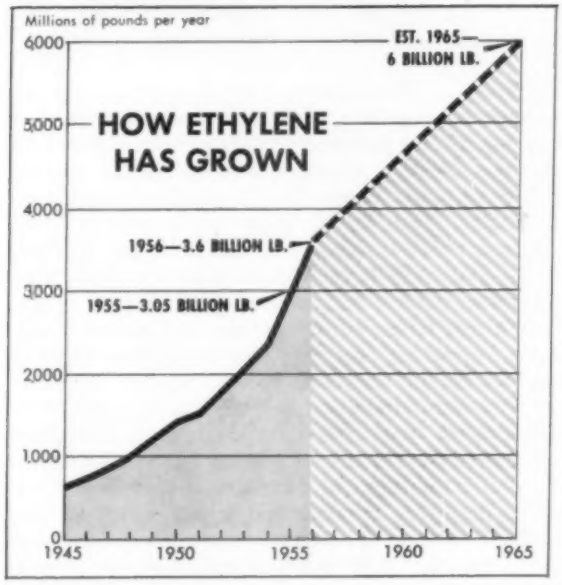
• **Tennessee Gas Transmission Co.** will complete a 10-M.M.c.f.d. absorption-type plant near Lovington, N. M., early 1958. It will produce 43,000 gal. daily of propane, butanes, and natural gasoline.

• **The Texas Co.** will build a $6,000,000 plant in Aneth field, Utah. It will recover propane, butane, and natural gasoline.

W

• **Warren Petroleum Corp.** and **Sunray Mid-Continent Oil Co.** plan to build a plant near Mocane pool, Beaver County, Oklahoma, by late 1958. The 100-M.M.c.f.d. plant will be the refrigeration-absorption type, with liquid output of 100,000 gal. daily. Warren will operate the $3,000,000 plant.

• **Wiseco Processing Plant, Inc.** (Warren Petroleum Corp. and Christie, Mitchell & Mitchell), will complete January 1958, a $3,000,000, 150-M.M.c.f.d. plant near Bridgeport, Wise County, Texas. It will extract 220,000 gal. daily of propane, butane, isobutane, and natural gasoline.



Ethylene Still Leads Growth Of Petrochemicals

. . . but shift in pattern is due

LAST YEAR at this time (OGJ, Jan. 28, '57, p. 178) we charted capital outlays of the chemical and allied products industry for the years starting with 1945. For 1957 we estimated capital expenditures at a maximum of 1.7 billion dollars. This turned out to be a little conservative; end-of-1957 estimates indicated that capital investment for 1957 appears to have been closer to 1.8 billion dollars.

For the chemical-and-allied-products industry the expectation is that capital expenditures will be about 5 per cent lower than in 1957. The petrochemical portion of the industry has been expanding faster than the rest of the industry and the cut may be a little sharper here.

Petrochemicals—No. 1 Building Block

We were much too conservative in this space last year in our predictions of ethylene growth. In this, however, we had plenty of company. Market researchers generally tend to be too conservative in their estimate of the fast-growing segments of the petrochemical industry. The revised chart shows how far off we were. The estimate now is for close to 4 billion pounds ethylene consumption in 1957 and a projection to 6 billion pounds by 1965. This is not an unreasonable prediction, as noted by others. In fact, it may turn out to be too conservative again. However, there has been a big round of ethylene expansion spilling over into 1958 and for the next 2 years there should be enough capacity to meet the demand. Other predictions on ethylene growth are 5.4 billion pounds by 1961 and 6.5 by 1965.

Continued growth of the major ethylene derivatives is expected by all predictors, though they differ individually on the rate of growth. Polyethylene, the fastest growing of these derivatives, now takes 16 per cent of total ethylene. This is expected to go up to 20 per cent or more of total ethylene demand by 1960.

Shifting Ethylene Patterns

In assessing the future of ethylene, the petrochemical industry's No. 1 building block, several trends claim our attention.

Changing raw material sources . . . The percentage of ethylene based on refinery gas streams is today well below 50 per cent of the total ethylene manufactured. Major source is natural gas (cracking of ethane and propane). But natural-gas prices have risen on the Gulf Coast from an average at wellhead of 5-6 cents per M.c.f. in 1950 to an average of 12-13 cents and as high as 20 cents for new contracts today. This rise in natural-gas prices is certainly one reason and perhaps the chief one that Union Carbide is going to start with crude oil rather than natural gas in the new ethylene facilities to be built at Putnam, W. Va. The most likely guess as to what Carbide might do at this location is that it will steam-crack distillate fractions—naphtha, kerosine, and/or gas oil. An alternate guess is that Carbide may have developed a process for making high yields of ethylene from crude oil or reduced crude.

This latter is a technically difficult task; and, if aiming at maximum ethylene, it is the wrong way to go chemically as has been noted elsewhere. On the other hand, despite less favorable H/C ratio when starting with crude oil or reduced crude, one can crack deeper and aim also for increased yields of aromatics.

Greene and Widgery (joint CCDA-MCRA meeting at Houston, November 20-21, 1957) predict that by 1960 some 56 per cent of the ethylene manufacture on the Gulf Coast will be based on pyrolysis of propane and butane. There has been a shift already, in favored localities along the gulf, toward LPG. It is expected that refinery gas will account for nearly 50 per cent of the total Gulf Coast ethylene production by 1960. If the pattern set in 1960 holds, Greene and Widgery estimate that ethylene demand in 1965 will require a total of 110,000 bbl. per day of hydrocarbon raw material broken down this way:

Propane-butane	67,000 bbl.
Ethane-ethylene	38,000 bbl.
Naphtha and other petroleum fracts	5,000 bbl.

Captive and "free" ethylene . . . For 1956, the Tariff Commission figures show sales of ethylene at about

0.6 billion pounds out of a total production of 3.6 billion pounds, or 16.5 per cent of total production. Ethylene therefore still remains largely as a "captive" material. But the trend continues toward installation of central ethylene-producing plants which provide ethylene to other companies in the adjacent area. Esso at Baton Rouge and Gulf at Port Arthur are examples. Others are Petroleum Chemicals, Inc., at Lake Charles and Phillips at Sweeny, Tex. Another straw in the wind is formation of Union Olefins Co.—a new division of Union Carbide to handle sales of ethylene and other hydrocarbons.

Derivatives—polyethylene . . . The lustily growing infant among the major ethylene derivatives is polyethylene. This is a squawling, brawling infant which has been touted as the future king of the plastics. But the path to the throne is a rocky one. Competition in polyethylene has been rough. Then, at year's end, Du Pont was granted U. S. patent 2,816,883. This is a composition-of-matter patent covering polyethylene which continues to complicate the already complex linear polyethylene picture.

Of greater portent to polyethylene, however, is the advent of another claimant to the throne, the new-born polypropylene. For some time the curtain has been tightly drawn across the polypropylene stage, although the audience could hear sounds of much activity, shuffling of props, etc., behind the curtain. Now and then a few favored ones got a peek behind the curtain. Now the polypropylene play has begun, with Hercules and Montecatini on the stage so far. But many others have been hard at work in polypropylene. Hercules and Montecatini will have company; the stage could get a bit crowded before the play is over.

Propylene . . . Development of polypropylene shifts the spotlight to propylene. Of interest to refiners is the fact that for its new polypropylene plant Hercules will be getting high-purity propylene from the Sinclair refinery at Marcus Hook. On the Gulf Coast, Petroleum Chemicals, Inc., will shortly have available high-purity ethylene which it will sell to Du Pont and Spencer. In addition PCI can make available high-purity propylene suitable for polypropylene. It may be expected that future ethylene plants will include provisions for making propylene and we will get closer to the concept of an "olefin generator" type of plant.

Propylene production in 1956 was around 1.5 billion pounds (roughly 8.3 million barrels). Isopropyl alcohol (solvent and intermediate for acetone manufacture) is the principal derivative of propylene. Next come propylene tetramer and trimer which go into dodecyl benzene (detergent base), plasticizers, and nonyl phenol. Other important derivatives are glycerin and propylene oxide and glycols. Thus Jefferson Chemical Co., in the expansion of its ethylene facilities at Port Neches, is also giving attention to propylene and its derivatives such as propylene oxide glycol. Now the entry of polypropylene somewhat sooner than certain forecasters had anticipated may mean that propylene will go over the 2-billion-pound mark before 1965.

Journal Survey of Petrochemicals' Growth

A

• **Allied Chemical & Dye Corp.**, General Chemical Division, will build a sulfuric acid plant at Anacortes, Wash.

• **American Cyanamid Co.** will complete doubling capacity for hydrocyanic acid, acetylene, and acrylonitrile by mid-1958 at its Fortier plant at Avondale, La. Facilities for acrylonitrile derivatives are planned.

At Escambia Bay near Pensacola, Fla., acrylic-fiber facilities will be completed by mid-1958.

• **Ammonia Chemical Corp. of California** and **Monterey Oil Co.** will complete February 1958, a $5,000,000 anhydrous ammonia plant using 5 M.M.c.f.d. of natural gas as feed, at Huron, Calif.

• **Amoco Chemicals Corp.** will complete July 1958, at Joliet, Ill., a 60,000,000-lb. aromatic-oxidation plant to produce phthalic anhydride, isophthalic acid, terephthalic acid, dimethyl terephthalate, dimethyl isophthalate, and benzoic acid.

B

• **British American Oil Co., Ltd.**, will expand its Pincher Creek, Alta., sulfur plant to 800 tons per day by 1961.

C

• **Calcasieu Chemical Corp.** (Cities Service, Continental Oil Co., Mineral Industries, Inc., and Sears, Roebuck & Co.) will complete at Lake Charles, La., facilities to produce 8,000,000 gal. per year of ethylene oxide and ethylene glycol February 1958. Cost is $10,000,000. Petroleum Chemicals, Inc., will operate plant.

• **Canadian Hydrocarbons, Ltd.**, is considering a $25,000,000 plant to produce 80 tons per day of ammonia and 600 tons per day of high-analysis nitrogen fertilizers at Winnipeg, Man.

• **Canadian Industries, Ltd.**, will complete expansion of its Edmonton, Alta., polyethylene plant to 40,000,000 lb. per year by summer 1959. **Poole Construction Co.** has contract.

At Millhaven, Ont., a 200-ton per day ammonia plant is being built.

• **Carbide Chemicals Co.**, Division of Union Carbide Canada, Ltd., will increase polyethylene to 50,000,000 lb. per year and ethylene glycol to 30,000,000 lb. per year at Montreal East, Que. Cost will be $5,000,000.

• **Chemstrand Corp.** (Monsanto Chemical Co. and American Viscose Corp.) will expand acrylic-fiber capacity 15,000,000 lb. per year at Decatur, Ala., by mid-1958.

At Pensacola, Fla., nylon capacity will be expanded to 114,000,000 lb. per year by mid-1958.

• **Columbia Gas Systems, Inc.**, is building hydrocarbon-extraction facilities at Kenova, W. Va., at a cost of $8,000,000. **J. F. Pritchard & Co.** will complete the project December 1958.

At Siloam, Ky., a fractionation plant is planned. Cost will be $5,000,000.

• **Consolidated Chemical Industries, Inc.**, Division of Stauffer Chemical Co., will increase sulfur-recovery capacity 100 tons per day at Baytown, Tex., in first quarter 1958.

• **Copolymer Rubber & Chemical Corp.** will complete a $3,000,000 steam power plant at Baton Rouge, La., by end of 1958.

D

• **Diamond Alkali Co.** is considering a $10,000,000, 40-ton per day acetylene plant at its Deer Park plant, Pasadena, Tex. A 50,000,000-lb. per year vinyl chloride monomer unit will be completed early 1958.

At its Greens Bayou plant, Pasadena, Tex., DDT capacity is being expanded.

• **Dow Chemical Co.** will complete first quarter 1959, an acrylonitrile plant at Freeport, Tex. By March 1958, ethylene oxide and glycol and triethylene glycol capacities will be expanded.

At Plaquemine, La., a $50,000,000 plant to produce ethylene, propylene, glycols, vinyl chloride, and other chlorinated hydrocarbons and related products from liquid petroleum gas and brine will be completed in 1958.

At Bay City, Mich., facilities to produce ethylene and butadiene from refinery streams will be completed in 1958. Multimillion-dollar polyethylene-plastics facilities will be added by October 1958.

• **Dow Chemical Co. of Canada, Ltd.**, has under way projects totaling $7,000,000, and including ethylene glycol, chlorine, ethylene, styrene, and ammonia expansions at Sarnia, Ont.

• **Du Pont, E. I., de Nemours & Co.** is increasing high-pressure polyethylene capac-

ity, and increasing methanol capacity by 30,000,000 gal. per year at Orange, Tex.

At Laplace, La., a new plant to make linear polyethylene may be built. Site has been bought.

At Belle, W. Va., ammonia synthesis is being converted from coke oven gas to natural gas.

• **Du Pont Co. of Canada, Ltd.,** plans to complete, fall 1959, a low-pressure-process polyethylene plant near Sarnia, Ont.

E

• **Escambia Chemical Corp.** will complete a 16,000,000-gal. per year methanol plant at Pensacola, Fla., first quarter 1958.

• **Esso Standard Oil Co.** will complete early 1958, a plant to include ethylene recovery and manufacture by pyrolysis at Linden, N. J.

At Baton Rouge, La., a $12,000,000 ethylene-recovery unit is nearly completed. It's part of a $40,000,000 expansion program.

• **Ethyl Corp.** will complete a TEL plant at Pittsburg, Calif., by mid-1958.

At Baton Rouge, La., **Catalytic Construction Co.** will complete expansion of facilities summer 1958.

F

• **Firestone Tire & Rubber Co.** will complete expansion of butadiene 20,000 tons summer 1958, at Orange, Tex. **Catalytic Construction Co.** has contract.

• **Food Machinery & Chemical Corp.** will double capacity of carbon tetrachloride at South Charleston, W. Va., by mid-1958. **Fluor Corp., Ltd.,** has contract.

• **Frontier Oil Refining Co.,** Division of Ashland Oil & Refining Co., will complete early in 1958, a $3,250,000 catalytic-reformate plant to produce 4,500,000 gal. per year of benzene, and 12,000,000 gal. per year of toluene, xylenes, and heavy aromatics at North Tonawanda, N. Y.

G

• **General Aniline & Film** is building an $8,000,000, 60,000,000-lb. per year ethylene oxide and 35,000,000-lb. per year ethylene glycol plant at Linden, N. J.

• **Goodrich-Gulf Chemicals, Inc.,** is expanding capacity of its copolymer plant at Port Neches, Tex., by phases as adjoining butadiene plant is expanded.

At Institute, W. Va., a 4-year expansion and modernization program is planned.

• **Gulf Oil Corp.** will complete late 1958, new facilities for 30,000,000 gal. per year of benzene at Port Arthur, Tex. **Procon, Inc.,** has contract.

H

• **Hawthorne Chemical Corp.** (Hercules Powder Co. and Imperial Chemical Industries, Ltd.) is building facilities for formaldehyde, pentaerithrytol, and methanol at Louisiana, Mo., at a cost of $6,000,000. An $11,000,000, 35,000,000-lb. per year monomethyl methacrylate and polymer plant will be completed late 1958.

• **Hercules Powder Co.** will add synthetic-urea facilities at its Hercules, Calif., ammonia plant by fall 1958. It will produce 20,000 tons per year.

• **Humble Oil & Refining Co.** will complete a catalytic light-ends-recovery and ethylene unit (80,000,000 lb. per year) at Baytown, Tex., third quarter 1958. Capacity of ethylene unit will be doubled later. Expansion of butyl rubber capacity by 13,000 long tons per year will be completed first quarter 1958.

I

• **Imperial Oil, Ltd.,** will complete mid-1958, facilities to produce ethylene, propylene, butadiene, butylenes, aromatic distillates, aromatic tars, and petroleum polymers at Sarnia, Ont. Cost is $25,000,000.

J

• **Jefferson Chemical Co., Inc.,** has under way a $38,000,000 expansion program at Port Neches, Tex. Ethylene capacity will be 180,000,000 lb. per year, and ethylene oxide 165,000,000 lb. per year with addition of new direct-oxyidation units. Ethylene glycol will be 126,000,000 lb., and ethylene chloride will be added. Chlorine facilities and units for propylene oxide-glycol and other propylene derivatives will be built. Ethylene oxide specialties and morpholine will be expanded.

• **Jefferson Lake Sulphur Co.** will build a 425-ton sulfur-recovery plant on a Mobil Oil of Canada, Ltd., farmout, 19 miles north of Okotoks field near Calgary, Alta.

K

• **Koppers Co., Inc.,** (Chemical Division) will complete an expandable polystyrene bead plant at Kobuta, Pa., early in 1958.

L

• **Laurentide Chemical & Sulphur Co.** is building a 33,000-long-ton per year sulfur-recovery plant at Montreal East, Que.

M

• **Mississippi Chemical Corp.** will complete 150-ton per day expansion of nitric acid capacity at Yazoo City, Miss., March 1958. **Chemical & Industrial Corp.** of Cincinnati has contract.

• **Monsanto Chemical Co.** will increase capacity of its styrene-monomer plant by 40,000,000 lb. at Texas City, by June 1958. By early 1958, the plant's acetylene capacity will be upped 12,000,000 lb. Acrylonitrile capacity will later be increased to over 100,000,000 lb., and polyethylene capacity will be increased.

At Springfield, Mass., styrene-polymer capacity will be more than doubled by May 1958.

At El Dorado, Ark., a 100-ton per day urea plant will be built by fall 1958.

N

• **National Petrochemicals Corp.** will build a 75,000,000-lb. polyethylene plant on the Houston Ship Channel, late 1958.

At Tuscola, Ill., butadiene is being considered.

• **Neches Butane Products Co.** (Goodrich-Gulf and Texas-U. S. Chemical) will complete expansion of its butadiene plant at Port Neches, Tex., 110,000 short tons per year mid-1958. **Foster Wheeler Corp.** has contract.

O

• **Odessa Styrene Co.** (El Paso Natural Gas Products Co. and United Carbon Co.) will complete a $5,000,000, 35,000,000-lb. per year styrene plant at Odessa, Tex., January 1958. **Fish Engineering Corp.** has contract.

• **Oronite Chemical Co.** (Standard Oil Co. of California subsidiary) has asked for $12,000,000 Louisiana state-tax exemption to expand plant at Oak Point, La.

P

• **Petrocarbon Chemicals, Inc.,** plans to add a Udex unit to make pure benzene, toluene, and xylenes at Irving, Tex.

• **Petroleum Chemicals, Inc.,** (Cities Service and Continental Oil) will complete January 1958, a 200,000,000-lb. ethylene plant (designed for expansion to 300,000,000 lb.) at Lake Charles, La. An ammonia plant is being completed. A $17,000,000, 30,000-ton per year butyl-rubber plant is under consideration. **Foster Wheeler Corp.** is engineering the project.

• **Platte Chemical Co.** plans a $2,500,000, 200-ton per day sulfuric acid plant at Casper, Wyo.

• **Polymer Corp., Ltd.,** (Crown owned) plans to increase butadiene-styrene rubber production capacity, to construct a new specialty latex plant, and to increase butadiene production capacity at Sarnia, Ont.

Q

• **Quebec Ammonia Co., Ltd.,** plans a 125-ton per day ammonia plant at Varennes, Que., but plans have been postponed indefinitely.

R

• **Republic Oil & Refining Co.,** Division of Plymouth Oil Co., is building a 5,000-bbl. per day Udex unit to produce benzene, toluene, and xylenes at Texas City, Tex.

• **Richfield Oil Corp.** will complete May 1958, an 18,000,000-gal. per year benzene plant at Watson, Calif. Cost will be $6,500,000.

S

• **Shell Oil Co. of Canada, Ltd.,** will complete by early 1958, facilities for production of detergent alkylate at Montreal, Que.

• **Sinclair Chemicals, Inc.,** is expanding SO_3 sulfonation and lube-oil synthetic detergents additives at Houston. Facilities for high-purity propylene are being completed.

• **Spencer Chemical Co.** will complete summer 1958, expansion of polyethylene to 90,000,000 lb. per year at Orange, Tex.

At Henderson, Ky., a 100-ton per day urea plant will be completed summer 1958.

• **Standard Oil Co. of California** will complete a $3,000,000, 52,000,000-lb. per year xylene plant at Richmond, Calif., early in 1958. A $1,750,000 polybutene expansion program is being planned.

• **Stauffer Chemical Co.** will build a 400-ton per day sulfuric acid regeneration plant at Hammond, Ind.

T

• **Texas Eastman Co.,** Division of Eastman Kodak Co., is expanding oxo facilities to increase butyraldehydes and higher aldehydes capacity at Longview, Tex.

U

• **Union Carbide Chemicals Co.** will double production of acrylonitrile at Institute, W. Va., in 1958.

At Putnam, W. Va., a $50,000,000, 150,000,000-lb. per year ethylene and propylene plant will be completed in 1960. Ethanol, ethylene oxide and isopropanol will be made.

At Whiting, Ind., a 72,000,000-lb. high-pressure polyethylene plant will be built by early 1959.

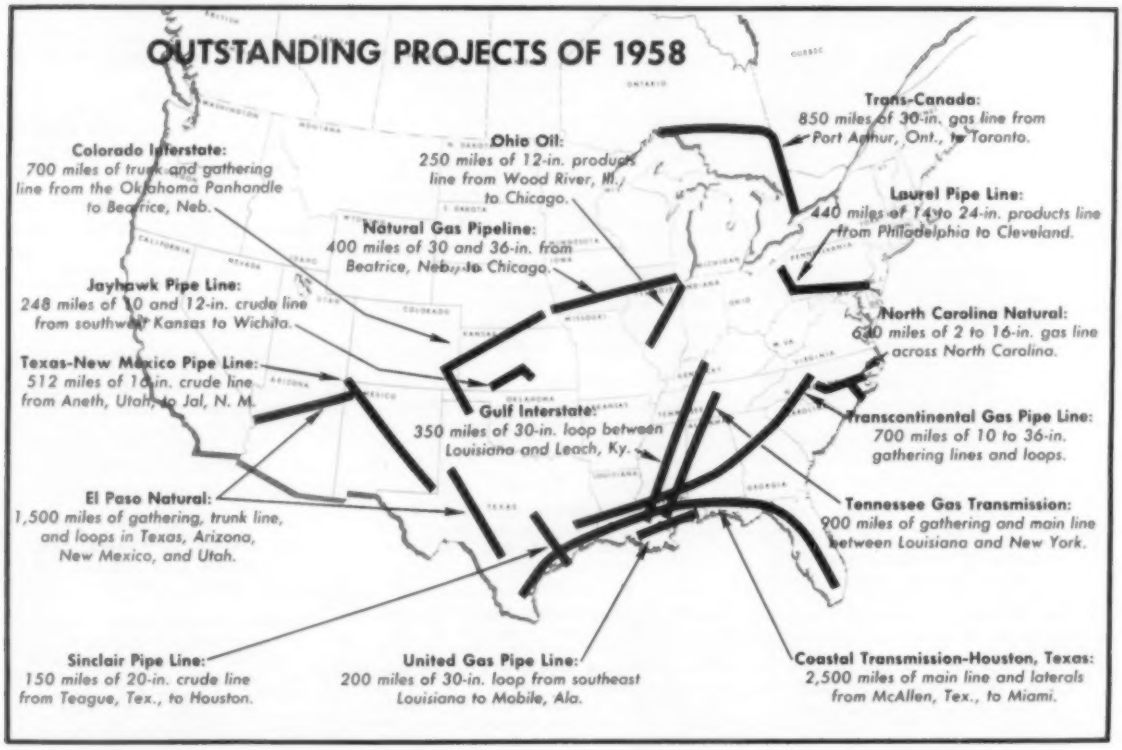
V

• **Vickers Petroleum Co., Inc.,** will complete a $2,000,000 UOP Udex unit to produce 15,000,000 gal. per year of benzene, toluene, xylene, and aromatics at Potwin, Kans., in January 1958.

• **Visking, Ltd.,** will build a $500,000 polyethylene plant at Fort Gary, Winnipeg, Man.

W

• **Wyandotte Chemicals Corp.,** Michigan Alkali Division, will complete a $20,000,000 electrolytic chlorine-caustic plant at Geismar, La., last half of 1958, as part of ethylene oxide facilities nearing completion.


OUTSTANDING PROJECTS OF 1958
Trans-Canada:
850 miles of 30-in. gas line from Port Arthur, Ont., to Toronto.
Ohio Oil:
250 miles of 12-in. products line from Wood River, Ill., to Chicago.
Colorado Interstate:
700 miles of trunk and gathering line from the Oklahoma Panhandle to Beatrice, Neb.
Laurel Pipe Line:
440 miles of 14 to 24-in. products line from Philadelphia to Cleveland.
Natural Gas Pipeline:
400 miles of 30 and 36-in. from Beatrice, Neb., to Chicago.
Jayhawk Pipe Line:
248 miles of 10 and 12-in. crude line from southwest Kansas to Wichita.
North Carolina Natural:
630 miles of 2 to 16-in. gas line across North Carolina.
Texas-New Mexico Pipe Line:
512 miles of 16-in. crude line from Aneth, Utah, to Jal, N. M.
Gulf Interstate:
350 miles of 30-in. loop between Louisiana and Leach, Ky.
Transcontinental Gas Pipe Line:
700 miles of 10 to 36-in. gathering lines and loops.
El Paso Natural:
1,500 miles of gathering, trunk line, and loops in Texas, Arizona, New Mexico, and Utah.
Tennessee Gas Transmission:
900 miles of gathering and main line between Louisiana and New York.
Sinclair Pipe Line:
150 miles of 20-in. crude line from Teague, Tex., to Houston.
United Gas Pipe Line:
200 miles of 30-in. loop from southeast Louisiana to Mobile, Ala.
Coastal Transmission-Houston, Texas:
2,500 miles of main line and laterals from McAllen, Tex., to Miami.

Pipeline building has biggest year

LAST YEAR was the biggest on record for pipeline construction in the United States and Canada. And 1958 will be a big year, too, although activity won't quite reach the '57 level. The industry will take a breather, but not much, and the long-term outlook is a continued high construction activity to meet the increasing demand for crude oil, refined products, and natural gas.

Industry pessimism over the depressing effects of political, regulatory, financial, and market problems is contradicted by confidential reports of the companies which build pipelines. In a world-wide survey conducted by The Oil and Gas Journal, here is the construction picture outlined by the companies in the United States and Canada for 1958:

. . . **Natural gas**—14,700 miles.
. . . **Crude**—3,000 miles.
. . . **Products**—1,700.

Greater mileage was laid last year in all three categories, as is shown by reports from U. S. and Canadian pipelines for 1957:

. . . **Natural gas**—15,400 miles
. . . **Crude**—4,800 miles.
. . . **Products**—2,900 miles.

Past experience has shown that mileage actually laid in the United States and Canada runs 10 to 20 per cent more than company estimates at the beginning of the year. On the basis of this experience it is reasonable to anticipate that lines completed in the United States and Canada in 1958 could total 23,000 miles. Adding 3,700 miles of planned foreign lines would give an estimated world total of 26,700 miles for 1958.

U. S. Construction

The reports from companies indicating record pipeline construction in 1957 is borne out by record steel shipments for the year.

Total mileage laid in the United States last year was 19,900 miles. Gas lines accounted for 13,100 miles, crude lines 3,900 miles, and products lines 2,900 miles. The outlook this year is for construction of gas lines totaling 12,800 miles, crude lines 2,700 miles, and products lines 1,700 miles—below 1957 but above 1956.

Natural gas . . . The gloom caused in some circles by the Memphis decision, requiring advance approval of customers before rates can be filed, is reflected only in small measure in their estimates for 1958. The demand for natural gas continues to increase rapidly. Gas supplies have been contracted for to fill this de-

mand. And some 2 billion dollars has been budgeted for construction this year, only slightly below 1957.

There may be a delay in the start of some projects —some have already been deferred by Memphis-decision complications—but the general feeling in the industry is this: while the construction season may be slow in starting, activity will pick up as regulatory problems are solved and 1958 will end up as another good year.

Heading the list of products affected by the Memphis decision is the $180,000,000 Beatrice project planned by Natural Gas Pipeline Co. of America and Colorado Interstate Gas Co. It was scheduled to start early this year, if FPC approved, but the new financing and customer-contract situation forced a delay. It is expected to be built during 1958, however. It will involve laying more than 1,000 miles of pipe, mostly 30 and 36-in., between Oklahoma and Chicago.

The biggest single project of the year will be the Coastal Transmission Corp.-Houston Texas Gas & Oil Corp. line from McAllen, Tex., to Miami, Fla. After a long FPC and court battle with competing fuels, this line is ready to go. There will be some 1,500 miles of main line from 12 to 24-in. and another 1,000 miles of gathering lines and sales laterals.

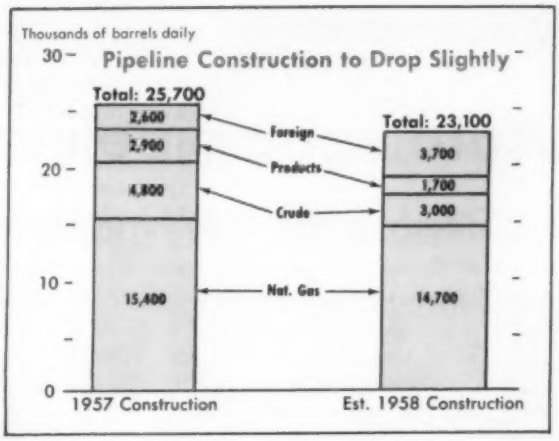
El Paso Natural Gas Co., which must build almost the equivalent of a new pipeline a year to meet growing California demand, plans a bigger program this year than last. It expects to lay some 1,500 miles of gathering lines in Texas, Arizona, New Mexico, and Utah to expand deliveries by 185,000 M.c.f. daily.

Transcontinental Gas Pipe Line Corp. will lay more than 700 miles of main-line loop and gathering lines on the Gulf Coast and in South Texas. Tennessee Gas Transmission Co., after a rare quiet construction year, plans some 900 miles of line this year.

A big question mark this year is disposition of the Midwestern case. The delay in availability of gas from Trans-Canada Pipe Lines, Ltd., has further complicated FPC hearings on competing applications with Midwestern Gas Transmission Co., a Tennessee Gas affiliate. The case was ready for a decision until creation of a Canadian royal commission which isn't expected to report its findings on availability of Canadian gas for export for 2 years. Half of Midwestern's proposed 400,000 M.c.f. daily volume was to come from Trans-Canada. Approval of the Midwestern line, from Emerson, Man., to Portland, Tenn., or the competing applications of Northern Natural Gas Co., Natural Gas Pipeline, and American Natural Gas Co., affiliates would open up between 2,000 and 3,000 miles in construction. But these projects aren't included in 1958 mileage forecasts.

Crude pipelines . . . The soft crude market and tight money have combined to exert a depressing influence on crude-line construction this year. But the picture can change more rapidly in this phase of pipelining than in natural gas. Companies invariably build more lines during the year than they are ready to disclose at the start of the year.

The dominant influence on crude pipeline construction last year and this year is the development of the Four Corners area as a major oil province. The outstanding project of 1957 was the 750-mile, 16-in.



Four Corners Pipe Line Co. line from Aneth, Utah, to Los Angeles. Aneth will be the origin of the biggest project in sight this year, too. It's the 515-mile, 16-in. Texas-New Mexico Pipe Line Co. now being built to Jal, N. M.

Jayhawk Pipe Line Co. (Colorado Oil & Gas Corp. and National Cooperative Refinery Association), plans a 248-mile 10 and 12-in. line from southwestern Kansas to Wichita. It will make available pipeline transportation to this area of Kansas and northwestern Oklahoma as well. Shell Pipe Line Corp. plans a 121-mile 8 to 20-in. line on the Louisiana Gulf Coast.

Products pipelines . . . Major interest in 1957 was on the conversion of the Little Big Inch back to products from Baytown, Tex., to Moundsville, W. Va., and construction of a 230-mile, 14-in. lateral to Chicago. This 20-in. main line is the largest products system in existence.

Laurel Pipe Line Co. (Gulf Refining, Texaco, and Sinclair) has the biggest products project this year. The 440-mile line from Philadelphia to Cleveland will be the first to use 24-in. pipe for products transportation. It will start in April.

Canada

Canadian construction is due to drop this year from a total of 3,200 miles to 2,200 miles. The drop in gas-line construction will be small—from 2,300 miles to 1,900 miles. Companies reported only 300 miles of crude lines planned for 1958 against 900 last year. Several hundred miles of projects on the drawing boards were deferred because of the reduced demand for Canadian crude. An improvement in the market would reinstate these projects and step up pipeline activity.

The biggest events of the year were completion of Westcoast Transmission Co., Ltd.'s, 650-mile, 30-in. gas line from Peace River to Sumas, Wash., the first major line to export gas to the United States, and startup of partial operations of Trans-Canada Pipe Lines, Ltd. Trans-Canada laid more than 1,000 miles of 20 to 34-in. pipe in 1957 and plans about 850 miles of 30-in. this year, filling in the Ontario gap in the 2,300-mile line from Alberta to Montreal. Both systems plan expansion of gathering lines to supply increased volumes of gas in 1958.

√ TRANSPORTATION

Automatic pipeline moves nearer

... Steady progress toward remote control featured year's advances

THE CONTINUED high level of pipeline construction last year was matched by technical progress in transportation of natural gas and liquids. New ideas in construction and operation, new instruments and equipment, and new and expanded uses of existing equipment added to the efficiency, economy, and safety of pipeline transportation.

There were no revolutionary developments. But the industry did reach milestones in all branches as new problems were met and solved and new methods developed. If there was one trend that was more pronounced than any other, it was the steady progress in use of automatic controls pointing toward more remote control and ultimately to the completely automatic pipeline.

Natural Gas Lines

The use of new or improved power drives at compressor stations, with their implications for future remote control, was the most significant development in natural-gas pipelining during 1957. Two events of wide interest in the industry involved engine-driven centrifugal compressor units.

Westcoast Transmission Co., Ltd., became the first natural-gas pipeline system to install engine-driven centrifugals at all downstream stations. These new drives for gas pipelining have scarcely 2 years' operating experience to their credit. So Westcoast made a great impression on the industry by its decision to use them at all stations except the originating station.

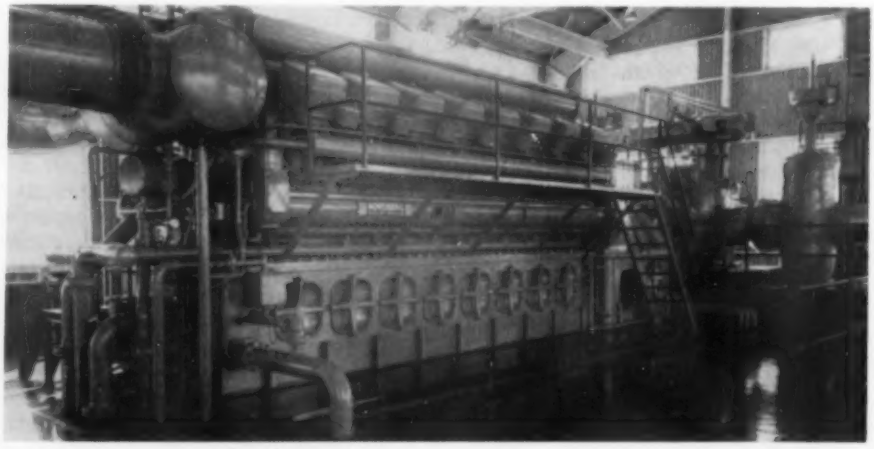
Gulf Interstate Gas Co., the most aggressive developer of compressor station automation, expressed its confidence in engine-driven centrifugals and their remote control by building four new intermediate stations for this service. The stations were designed from the ground up for this type of unit drive and for remote control. Supporting the decision to build the stations there were thorough test operations as well as normal operating experience at the pilot Stanton, Ky., station. The new stations went into operation around the first of this year.

This move is underscored by the statement of Norman F. Blundell, vice president and chief engineer of Gulf Interstate: "I feel that any new pipeline that will be built in the future will be—and should be—fully automatic." This is an unusually bold stand in an industry which has tended to take automation in small, deliberate bites—if at all.

The increasing use of gas turbines was part of the trend toward more automation last year, and with it there has been a greater recognition of the significance of the centrifugal compressor, which still occupies a minor position in relation to reciprocating units.

The giant 15,000-hp. electric synchronous motors (driving centrifugal compressors) were developed for Texas Eastern Transmission Corp. and installed at two base-load stations on its 30-in. main line from Kosciusko, Miss., to Uniontown, Pa. These have attracted wide interest. Texas Eastern achieved the lowest investment per horsepower and the lowest operating costs in gas transmission at these stations. This huge power package is limited, however, to high load-factor lines and locations where cheap power is available. But these single-unit stations are significant for

Three types of drives for centrifugal compressors were involved in major gas-transmission progress



... gas engine

their unparalleled economy, efficiency, and their adaptability to automation.

Supercharging became more popular as a means of gaining increased horsepower with relatively small investment. More companies bought computers or used computer services to solve problems of scheduling, well deliverability, gathering-system design, and design of station piping to minimize surges.

Crude and Product Lines

Measurement of crude oil and custody transfer received a great deal of attention during the year. Positive-displacement meters gained in acceptance, and a big new meter with capacity of 10,000 bbl. per hour was proved in operation. This type of meter was prominent in two new pipeline systems which were started in 1957.

Texas got its first lease automatic custody transfer (LACT) unit with p.d. meters in unattended operation and without duplicate measurement in the lease tank. The significance of LACT is illustrated by its fairly rapid growth. In October 1955 there was but one lease in the United States selling oil automatically. Now there are about 100 in existence. More are coming because of advantages through labor savings, lower tank investment, reduced loss of light ends, and accuracy. Next step: a pipeline system which receives crude solely by automatic custody transfer.

The problems of viscous crudes received intensive study and a variety of solutions was applied in design of scattered lines over the world. Three new systems employed heat, pressure, and larger diameters of pipe to overcome deterrents to transporting heavy crudes.

Development of a new fast, sensitive, accurate recorder gravitometer by Sinclair Pipe Line Co. advanced the technique of automatic blending of crudes to a constant outgoing gravity. Supervisory control employed in remote operation was applied at the local level in a pumping station. And a new concept in controls and telemetering was introduced: Only data significant to the operation of the pipeline are logged under this system.

Gas turbines were introduced on liquid lines for the first time. They were installed at stations on Trans-Arabian Pipe Line Co.'s crude system and on the Great Lakes Pipe Line Co. products system.

An experiment by Standard Oil Co. (Ind.) in automatic deliveries from a products line to a bulk plant proved successful.

Pipelining of LPG, although several years old, received renewed interests. The trend toward larger diameters for products lines was underscored by the decision of Laurel Pipe Line Co. to use 24-in. pipe.

Variable-speed drives, long considered impractical for pipeline pumping stations, were installed on a major crude trunk line after successful trial on a products line. Other installations are plannned as means of cutting power costs, for lowering investment in multiple units installed for flexibility, and for lower maintenance costs.

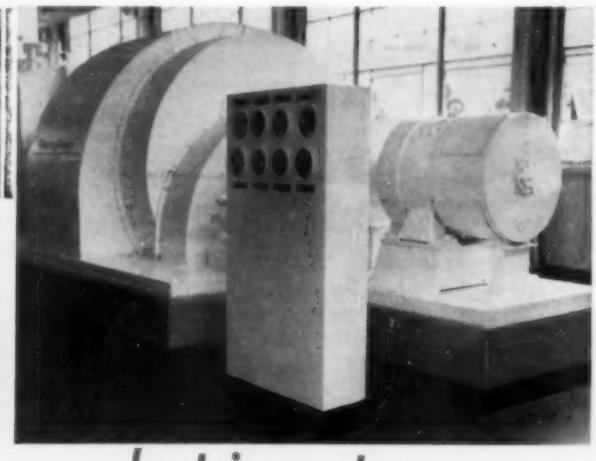
Construction

Problems connected with building offshore crude and gas lines were attacked as this new province gained importance. Soil mechanics suddenly became a critical subject for study as the peculiar behavior of the Gulf of Mexico floor affects pipelines and their permanence.

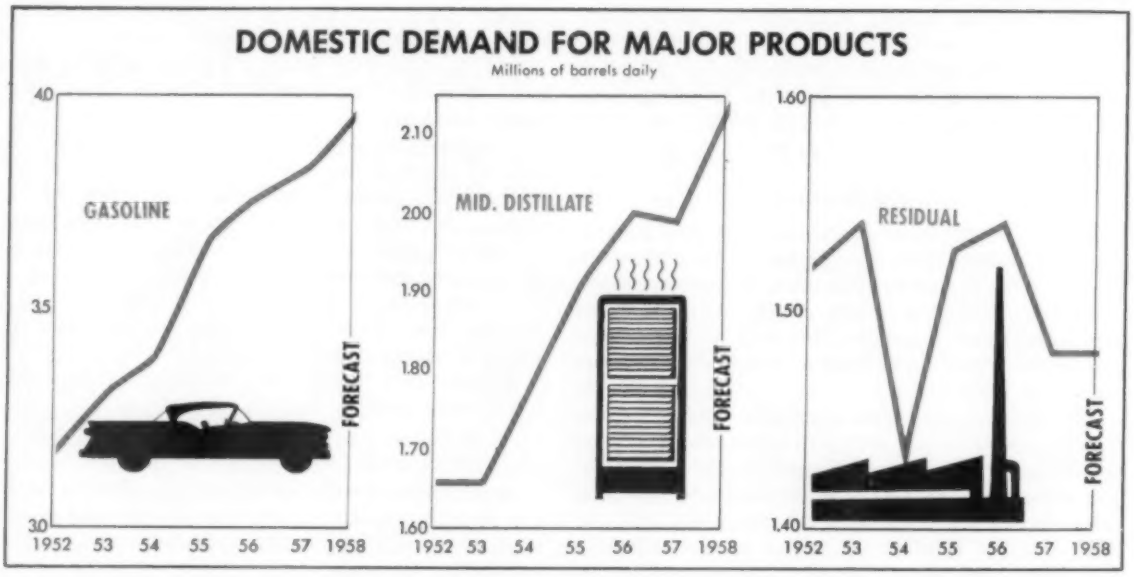
New pipelaying barges were designed and built especially for offshore construction, and innovations were introduced to permit pipe laying in deep water. One new device—called a "stinger"—cradles the pipe on its way to the bottom. It consists of two lengths of 30-in. pipe 352 ft. long tied together by 12-in. pipe. The stinger, free to pivot up and down, has controlled buoyancy and guards against cracking the concrete weight coating and buckling of pipe as it is launched.

Tapes and other plastics are significant innovations for pipe protection on some recent projects. The interest in new coatings—especially tough thin-film plastic coatings—was connected with the trend to thin-wall pipe. Company pressure is increasing for thin-wall pipe with a tough coating as a means of lowering construction and maintenance investment costs.

. . . gas turbine



. . . electric motor



Demand will hit 9.47 million barrels

DOMESTIC DEMAND for petroleum products will increase about 3.8 per cent to 9,470,000 bbl. daily in 1958. This gain is smaller than the general postwar average, and even part of this increase is due to the fact that the comparison is made with a very poor record for 1957.

Domestic demand for all products in 1957 is estimated at 8,795,000 bbl. daily or only about 0.2 per cent more than in 1956. Exports for 1957 were higher than in 1956, since increased shipments during the Suez crisis were split into 5 months for 1957 and 2 months for 1956. Total demand in 1957 was up 1.8 per cent.

Since exports will be back nearer to normal in 1958, the percentage increase in total demand will be about 1.2 per cent compared with the 3.8 per cent for domestic demand.

The forecasts for 1958 are based on the following assumptions:

... **Weather** will be near normal in the first and last quarters of the year.

... **Imports** will average about a million barrels daily, allowing for small variations from import quotas in effect at the end of 1957.

... **Total stocks** at the end of the year will be about the same as at the end of 1957. There will be some shifts by products.

... **The over-all economy** will dip slightly in the first half of the year with recovery starting in the third quarter.

... **Supply patterns** will be kept at low levels during the first half to bring inventories a little more in line with demand.

Domestic demand for middle distillates will increase 7.8 per cent in 1958. Most of the gain will be due to the low base figure for 1947 rather than to a high level in 1958. Middle distillates averaged only 1,975,000 bbl. daily in 1957 or 1.4 per cent less than in 1956 and only 3.2 per cent more than in 1955.

Total stocks of crude and products amounted to about 830,000,000 bbl. at the end of 1957 for an increase of 50,000,000 bbl. during the year. Since stocks gained over 65,000,000 bbl. in 1956, the 2-year addition of 115,000,000 bbl. eliminated the need for any further accumulation in 1958.

Supply schedules for 1958 are expected to follow a more normal pattern than in 1957. Production and refinery runs were very high in the first quarter of 1957 to meet export demands. The new-supply program for the second quarter could not be cut fast enough to cover the combined drop in exports and domestic demand. The result was a big increase in stocks. Excessive inventories forced heavy cuts in production for the fourth quarter.

For 1958, supply in the first quarter should be no more than 0.5 per cent above the average expected for the year. The second-quarter average should be about 2 per cent below the year's average and the third quarter almost 1.0 per cent below. These reductions will permit an increase in the fourth quarter to about 2.2 per cent over the average for the year.

A better distribution of supply in 1958 will result in more market stability.

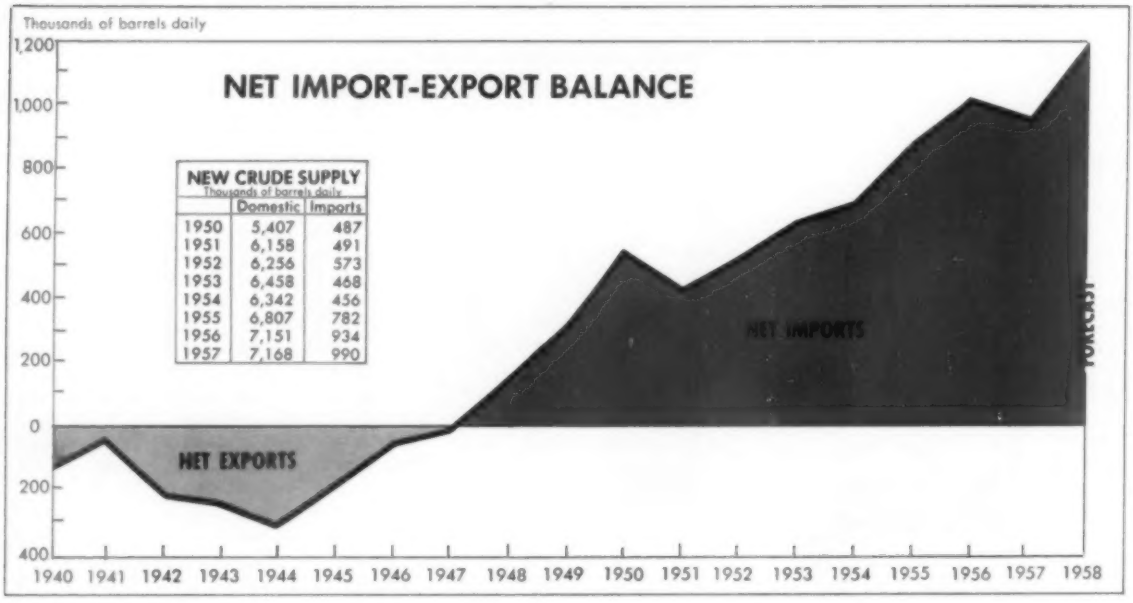
Journal forcast of supply and demand, by quarters

(Thousands of barrels daily)

	1st quarter		2nd quarter		3rd quarter		4th quarter		Year 1958	
	Vol.	Per cent change	Vol.	Per cent change	Vol.	Per cent change	Vol.	Per cent change	Vol.	Per cent change
Domestic demand	**9,950**	**2.8**	**8,485**	**3.6**	**8,460**	**3.1**	**9,650**	**5.8**	**9,133**	**3.8**
Gasoline	3,600	1.5	4,090	2.9	4,160	2.7	3,880	4.7	3,934	3.0
Kerosine	460	2.4	160	— 2.4	190	7.3	400	5.3	302	3.4
Distillate	2,610	7.0	1,330	9.2	1,180	5.3	2,190	11.5	1,825	8.4
Residual	1,765	— 1.7	1,350	— 3.2	1,220	— 0.8	1,580	4.6	1,477	— 0.3
Jet fuel	240	1.3	220	18.3	230	24.3	230	15.0	230	13.9
Lubricants	115	— 1.7	120	3.4	120	2.6	120	— 4.0	119	....
LPG	540	8.2	390	9.2	410	4.9	570	4.6	477	6.5
Asphalt and road oil	120	2.0	325	15.7	460	5.6	230	6.0	284	8.0
Other products	455	11.2	455	— 3.2	445	— 6.9	405	— 4.9	440	....
Crude loss	45	—32.8	45	73.1	45	4.7	45	— 2.2	45	— 4.2
Export	**340**	**—69.9**	**342**	**—42.5**	**337**	**—10.8**	**327**	**— 4.7**	**337**	**—40.0**
Gasoline	90	—33.8	90	— 7.2	90	—10.0	85	—10.5	89	—16.8
Kerosine	8	—75.8	10	—37.5	5	....	10	100.0	8	—42.9
Distillate	62	—73.6	60	—53.1	65	—17.7	60	—20.0	62	—51.9
Residual	70	—48.5	75	—36.4	75	—15.7	75	....	74	—28.8
Jet fuel	....	....	....	....	....	....	....	....	....	....
Lubricants	37	— 2.6	42	....	35	— 2.8	32	....	36	— 2.7
LPG	13	....	10	—16.7	12	....	15	50.0	13	8.3
Asphalt and road oil	5	25.0	5	....	5	—28.6	5	66.7	5	....
Other products	26	45.0	21	16.6	21	16.7	16	— 1.1	21	5.2
Crude	29	—91.2	29	—81.8	29	— 9.4	29	— 3.3	29	—78.7
Total demand	**10,290**	**— 3.1**	**8,827**	**0.5**	**8,797**	**2.5**	**9,977**	**5.4**	**9,470**	**1.2**
Gasoline	3,690	0.2	4,180	2.7	4,250	2.4	3,965	4.3	4,023	2.4
Kerosine	468	— 2.9	170	— 5.6	195	7.1	410	6.5	310	1.3
Distillate	2,672	— 0.1	1,390	3.3	1,245	3.8	2,250	10.3	1,887	4.1
Residual	1,835	— 5.0	1,425	— 5.8	1,295	— 1.8	1,655	4.4	1,551	— 2.1
Jet fuel	240	1.3	220	18.3	230	24.3	230	15.0	230	13.9
Lubricants	152	— 1.9	162	2.5	155	1.3	152	— 3.2	155	— 0.6
LPG	553	8.0	400	8.4	422	4.7	585	5.4	490	6.5
Asphalt and road oil	125	1.6	330	15.4	465	5.4	235	6.8	289	7.8
Other products	481	12.9	476	— 1.0	466	1.3	421	— 5.1	461	0.6
Crude	74	—81.3	74	—61.5	74	— 1.3	74	— 2.6	74	—59.6
Stock change	**—770**	....	**465**	....	**595**	....	**—300**	....	**0**	....
Crude	— 50	....	45	....	....	....	....	....	—1	....
Products	—720	....	420	....	595	....	—300	....	1	....
New supply	**9,520**	**— 3.8**	**9,292**	**— 4.6**	**9,392**	**2.1**	**9,677**	**5.7**	**9,470**	**— 0.2**
Imports	**1,590**	**10.3**	**1,510**	**— 3.7**	**1,440**	**— 9.0**	**1,570**	**5.4**	**1,527**	**0.5**
Crude	990	22.5	1,000	— 3.1	1,000	—13.8	1,010	5.6	1,000	1.0
Products	600	— 5.2	510	— 4.9	440	4.5	560	5.1	527	— 0.6
Production	**7,930**	**— 6.2**	**7,782**	**— 4.7**	**7,952**	**4.4**	**8,107**	**5.8**	**7,943**	**— 0.4**
Crude	7,070	— 7.3	6,967	— 5.4	7,132	4.1	7,237	5.7	7,102	— 0.9
Natural, etc.	860	3.2	815	1.4	820	6.4	870	6.9	841	4.5
Runs to stills	**8,013**	**— 1.5**	**7,825**	**— 0.5**	**8,035**	**1.0**	**8,150**	**5.6**	**8,006**	**1.1**
Total stocks†	**761.1**	....	**803.4**	....	**858.1**	....	**830.5**	....	**830.5**	....
Gasoline	216.9	....	191.4	....	175.9	....	191.7	....	191.7	....
Kerosine	17.4	....	26.3	....	36.1	....	30.1	....	30.1	....
Distillate	83.0	....	119.8	....	177.7	....	154.7	....	154.7	....
Residual	47.1	....	53.3	....	61.9	....	54.8	....	54.8	....
Other products	122.6	....	134.4	....	128.3	....	121.0	....	121.0	....
Crude	274.1	....	278.2	....	278.2	....	278.2	....	278.2	....

†Stocks in millions of barrels at end of period.

✓ SUPPLY



"Something was done about imports"

FOR MOST oil producers in this country, 1957 will stand out as the year when something was done about imports.

Total imports reached a low point in 1942 when movement by tanker was hampered by submarine activity during World War II. Except for the adjustment year of 1951, total imports showed a gain every year from 1942 through 1956.

For the 1946-56 period, total imports increased 278 per cent. Production of natural-gas liquids, including benzene blended for motor fuel, gained 143.9 per cent. Crude oil had a relatively small gain of 50.5 per cent.

Attempts to restrict crude and product imports in the past have not been too successful. In the trade agreement with Venezuela effective December 1939, the excise tax on crude, topped crude, residual, and gas oil was reduced, subject to a tariff quota. The reduction was from 21 cents to 10.5 cents a barrel on volumes up to 5 per cent of crude processed in domestic refineries during the preceding calendar year.

In the trade agreement with Mexico, the quantity limitation at the reduced rate was discontinued, effective January 1943. The high demands of World War II reduced the need for limitations on imports.

The trade agreement with Mexico was abrogated in 1950. This action returned the import problem to the Venezuelan agreement of 1939.

War again furnished at least a temporary solution for the import problem. Increased industrial activity in this country combined with the fuel demands for the Korean War eased the pressure against imports. The quota system proved to be very unsatisfactory in 1951.

The growth in imports is shown by the figures in the table of import-export trends. Note that total imports topped a million barrels daily in 1953 after passing the 500,000-bbl. mark in 1948.

Actual import data for 10 months and preliminary weekly figures for November and December show that the import total went above 1,500,000 bbl. daily in 1957. The average for 1956 was 1,436,000 bbl. daily.

Middle East Shipments Dropped

Certain factors tended to blunt the rapid penetration of the American market by foreign crude in 1956 and 1957. The first was the closing of the Suez Canal.

The canal was closed at the end of October 1956. A few days later pipeline movement of crude through Syria was cut off. All of the remaining pipeline crude at ports on the Eastern Mediterranean was needed in Europe. Other crude for Europe came from the Middle East around the Cape of Good Hope. Crude also moved from Venezuela and the Gulf Coast area of the United States.

These changes resulted in a sharp reduction in shipments from the Middle East to this country in the last 2 months of 1956 and the first quarter of 1957.

In the fall of 1956, Arthur W. Flemming, then director of the Office of Defense Mobilization, said that but for the closing of the Suez Canal he would have been forced to send the import problem to the

Source of U. S. imports

First 10 Months
(Thousands of barrels)

	1957	1956	Change Volume	Change Per cent
Mexico	7.3	12.8	—5.5	—43.0
Colombia	22.0	25.4	—3.4	—13.4
Venezuela	534.9	449.6	85.3	19.0
Peru	....	2.0	—2.0	....
Ecuador	2.7	1.2	1.5	125.0
Trinidad	1.3	1.9	—0.6	—31.6
Kuwait	128.4	136.7	—8.3	—6.1
Saudi Arabia	49.8	84.6	—34.8	—41.1
Neutral Zone	9.8	21.9	—12.1	—55.3
Iraq	9.3	30.5	—21.2	—69.5
Iran	19.7	22.4	—2.7	—12.1
Qatar	4.1	14.8	—10.7	—72.3
Canada	157.4	108.9	48.5	44.5
Far East	56.9	33.7	23.2	68.8
Total	**1,003.6**	**946.4**	**57.2**	**6.0**

. . and the import-export score

(Thousands of barrels daily)

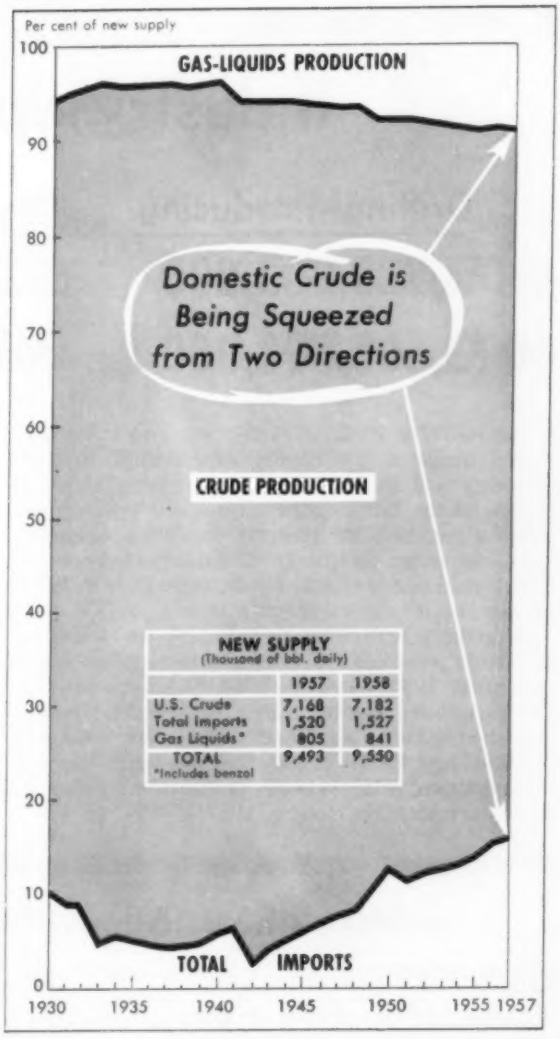
	Imports Crude	Imports Products	Imports Total	Exports Crude	Exports Products	Exports Total
1940	117	112	229	141	215	356
1941	139	127	266	91	207	298
1942	34	64	98	93	227	320
1943	38	136	174	113	298	411
1944	122	130	252	93	474	567
1945	203	108	311	90	411	501
1946	236	141	377	116	303	419
1947	267	170	437	127	324	451
1948	353	161	514	109	259	368
1949	421	224	645	91	236	327
1950	487	363	850	95	210	305
1951	490	354	844	78	344	422
1952	573	379	952	73	359	432
1953	648	386	1,034	55	347	402
1954	656	396	1,052	37	318	355
1955	782	466	1,248	32	336	368
1956	934	502	1,436	78	352	430
1957—						
1st. qr.	**808**	**632**	**1,440**	**329**	**611**	**940**
2nd. qr.	**1,032**	**537**	**1,569**	**159**	**435**	**594**
3rd. qr.	**1,161**	**421**	**1,582**	**32**	**345**	**377**
4th. qr.*	**956**	**533**	**1,489**	**30**	**313**	**343**
Year	**990**	**530**	**1,520**	**136**	**425**	**561**
1958†	1,000	527	1,527	29	308	337

*Estimated. †Forecast.

White House for action under Section 7 of the Trade Agreements Act.

Need for immediate action did not come up again until the canal opened in the spring of 1957. The new director of ODM, Gordon Gray, started a review and analysis of the situation. On April 23, ODM certified to the President that there is reason to believe that crude oil is being imported into the United States in such quantities as to threaten to impair the national security.

Only 2 days later, President Eisenhower stated that he agreed with the analysis and that he would have an investigation made to gather additional facts. Oil surpluses were piling up. The President dropped his original plan for a study by a commission of disinterested citizens and gave the job to cabinet officers whose departments have something to do with oil and foreign trade.



The resulting import control plan was on a "voluntary" basis and involved quotas for crude-importing companies. The plan also set up machinery to handle applications from new crude importers.

Administration of the plan was turned over to Navy Capt. M. V. Carson, Jr. Several of the importing companies asked for hearings to correct "inequities" in the formula. By the end of the year, a few adjustments had been made and most company plans showed projected crude imports in line with the program.

Also, by the end of the year the cabinet committee had completed and announced its plan for reducing crude imports on the West Coast. Crude-import allocations under that plan amounted to about 220,000 bbl. daily compared with actual imports for 1957 of about 275,000 bbl. daily. Company reports on plans for the first half of 1958 showed programed imports at almost 349,000 bbl. daily.

Total allocation for imported crude under combined east and west schedules amounted to about 990,000 bbl. daily. Allowing for minor variations from the quotas, total crude imports for 1958 probably will average about 1,000,000 bbl. daily.

√ CAPITAL EXPENDITURES

Industry optimism seen in 1958

	Drilling—Producing	Refining	Transportation
1958	$3,880,000,000	859,000,000	233,000,000
1957	$3,600,000,000	931,000,000	256,000,000

A MAJORITY of U. S. oil companies have more money budgeted for capital expenditures in 1958 than they had in 1957. This might seem surprising in view of the fact that the oil business is considered "off," along with the general somewhat pessimistic forecasts current for the U. S. industrial economy in 1958—particularly the first half. The second half of the petroleum year will be at a higher level.

But the actual figures received by the Journal in its annual questionnaire of capital-investment budgets show that 1958 totals are slightly above those for 1957. As usual, the big margin is for drilling-producing—the total is up to $3,880,000,000, versus $3,600,000,000 for 1957. The other branches—refining, transportation, natural gas-gas pipelines, marketing and other—are all fairly close to 1957.

The Journal's 1958 predictions are based on polling a representative number of companies operating all over the United States. These budget figures have been assembled on a confidential basis for each branch of the industry, and then projected to a 100 per cent industry-wide basis. Indexes used in the projections involve net crude-oil-production rates, refining throughputs, sales of petroleum products, all as achieved by individual companies.

More Drilling-Producing Costs

At first glance, the increase in budgeted capital for drilling-producing operations in 1958 might seem in conflict with the slight drop off in drilling, as predicted by the Journal for this year. However, both of these Journal predictions are based on actual com-

Here's how 16 basic industries fared last year and what

Construction

Outlays in 1958 expected to total 49.6 billion, or 5 per cent more than the record expenditure of 47.2 billion estimated for 1957. Private expenditures for new housing are due to contribute more to the boost than public, rising 1.4 billion to 34.7

Lumber

A somewhat better year is in prospect. If residential construction attains a level of 1.1 million houses, lumber production may reach 36.0 billion board feet, 2 billion more than 1957.

Automobiles, trucks

Production estimated at 6,117,000 units in 1957; some downturn is indicated for 1958. A reasonable estimate places auto output this year at 5.75 to 6 million units.

Outlook for motor-truck and truck-trailer manufacturing in 1958 is good. Truck production will approximate 1,100,000 units — equaling the 1956 figure—as compared with 1957 production of some 1,070,000. Truck-trailer production for 1958 will increase about 20 per cent over 1957, approximating 1956 level of 67,000 units.

Electrical

An industry which employs some 540,000 people and shipped out in excess of 6.5 billion dollars worth of merchandise in 1957 looks for another good year.

Iron and steel

Outlook for 1958 is a moderate decline from 1957. Ingots in 1958 are expected to total 108 to 110 million tons, as against 113 million in 1957. The reduced rate of steel output which characterized the last half of 1957 is expected to continue into the first half of 1958. Ingot capacity is expected to rise to about 141 million tons at the beginning of 1958, 7.6 million above 1957, and go to 146.5 million tons by year end.

With the 3-year labor contract not expiring until the middle of 1959, stable labor conditions should prevail in 1958. A semiannaul cost-of-living rise, which is part of the contract, takes effect at the beginning of the year, with a basic raise plus other benefits due at the middle of the year. Average price of steel rose about 6 per cent in 1957.

Construction machinery

Production and shipments will approximate the level for 1957, an average and profitable year with output estimated at 2 billion dollars. Prices will be up about 4 per cent.

Power

In the nuclear field, the two most promising factors for the immediate future are the foreign market for research and power reactors, and the government market for power reactors used for ship propulsion. Higher costs, both for installation and operation, have slowed the construction of domestic atomic plants. Present back-

budgets—Here's comparison with 1957

Gas-Gas Pipelines	Marketing, etc.	Total
590,000,000	462,000,000	6,024,000,000
750,000,000	463,000,000	6,000,000,000

pany-by-company figures, and the explanation for the increased appropriations comes about through:

First, drilling wells and completing them is becoming more expensive, due to the trend to deeper drilling, and to spending more money on wells to assure that they are completed more efficiently.

Second, additional money in 1958 is going to go into improved lease equipment and into new fields involving secondary recovery, and extensions to present water-flooding and gas-repressuring projects.

Some of the sizable expenditures that are going into improved producing facilities and the extension of secondary-recovery operations actually will be reflected by the addition of very considerable quantities of oil in the "future reserves" columns. Probably none or very little of the additional oil thus set up will be produced in 1958, and only a relatively small portion in 1959. Bulk of the additional reserves will be produced in a period of some 5 to 10 or more years.

One investor has this to say:

"The petroleum industry as a whole should enjoy a better year in 1958 than during 1957, although the comparative improvement will not begin to show up until mid-1958. Selling prices of petroleum products are expected to average very slightly (less than 1 per cent) above the 1957 mean level. Oil-company sales will be principally enlarged by an expected 3 per cent advance in domestic petroleum demand. Profit margins, on the whole, will conform to this year's pattern. Earnings for the oil group should be up a bit, and scattered dividend increases are possible where payout ratios are now moderate."

they expect in 1958. Check oil's outlook against their figures

log of orders will probably keep production in 1958 at about the same level as for 1957.

Consumer durables

Sales outlook in 1958 is neither overly optimistic nor is it pessimistic. In 1957, consumer-goods industries showed an average decline of 5 per cent from the record high levels of 1956. Activity in 1958 should equal that basis at least.

General industrial

Consensus in this multibillion-dollar industrial network seems to be one of cautious optimism toward 1958. Defense expenditures will be a key factor, and the looked-for expansion should hold production at the current level.

Oil-field machinery

This category, which includes water-well equipment, is expected to maintain if not slightly better its 1957 volume of business, which also is estimated to be up from the 1956 level. The United States has growing need for oil and gas, and wells must be dug to produce these.

Electronics

Total electronics factory output for 1958 is expected to be up about 5 per cent from the 7-billion-dollar business the industry did in 1957.

Aircraft

A relatively high sustained level of activity for this industry in 1958 is indicated by the 28.5-billion-dollar total of backlog. However, the shift in military programs to missiles and the indicated decrease in deliveries of commercial transports make it apparent that aircraft sales will be somewhat lower than in 1957.

Chemicals

Output of these byproducts of coal tar and petroleum is expected to be about 5 per cent up from 1957.

Plastics

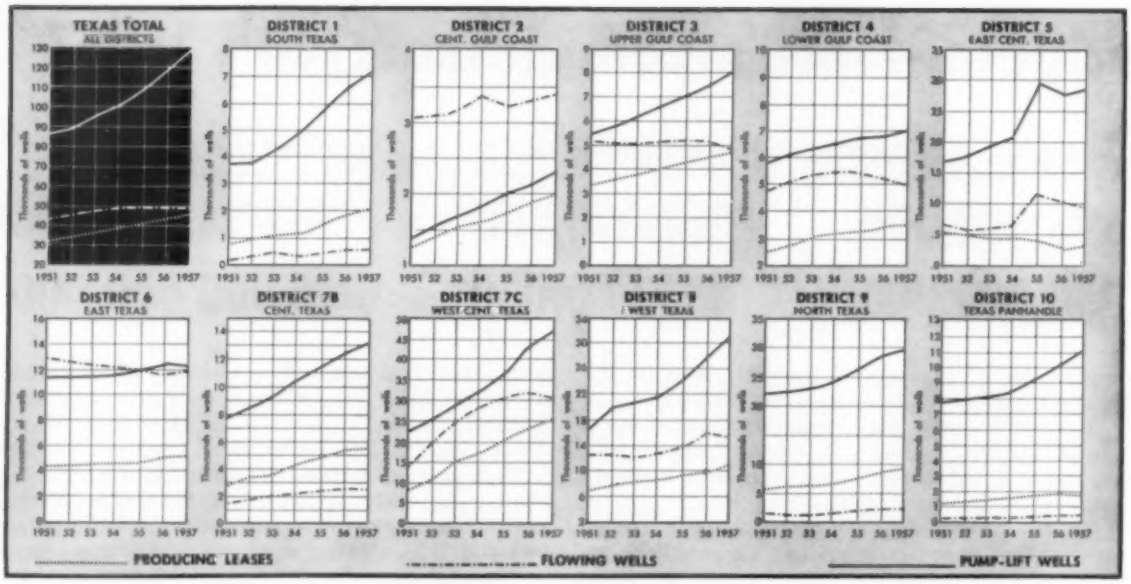
Growing use in virtually all fields portends a production increase of about 5 per cent.

Synthetic rubber

Domestic consumption plus exports would justify a production of about 1,210,000 tons—a level approximately 10.5 per cent above 1957. Total consumption of both natural and synthetic rubber in this country in 1958 is estimated at 1,525,000 tons—a 3 per cent rise over 1957.

Communications

Construction, equipment, and new-plant expenditures in this industry, which covers telephone, telegraph, and international communications companies, together with the commercial central stations communications companies, are expected to show a record total of 2.9 billion dollars for 1957, a jump of 12 per cent for the year. A slight drop to 2.5 billion is forecast for 1958.



24,041 wells to go on pump in '58

SEVERAL FACTORS will combine to reduce the total number of wells to be put on the pump in 1958 to only 24,041 pumpers. First, operators are becoming more selective in their drilling, concentrating on prospects with high reserves where possible, rather than the low-risk, low-reserve type of prospect so popular during the past several years. Second, the slight curtailment in anticipated drilling for the year, too, means fewer completions, and of course, fewer wells going on pump.

New Feature in Statistics

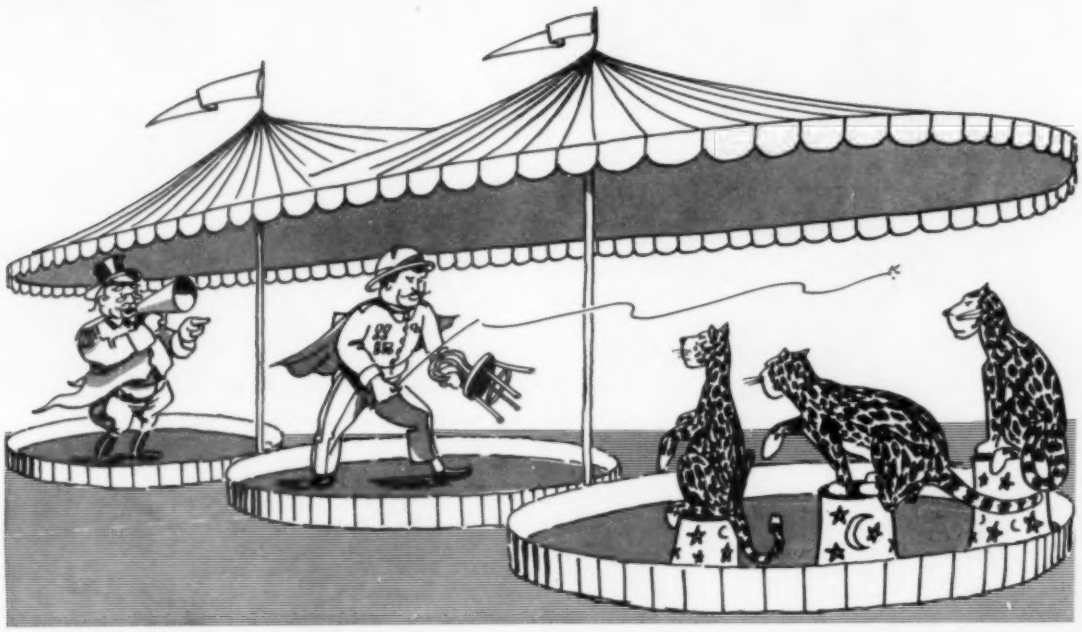
The estimate for 1958, as in past years, includes both new pumping wells and old flowing wells that will be put on the pump during the year. A new feature of these statistics is the inclusion of the actual per cent of each state's oil wells that are on artificial lift and those that are flowing. These new figures bring out all too clearly the paucity of flowing wells in many areas of the United States. There are only a handful of flowing wells east of the Mississippi River. And data on most states west of the Mississippi show that 95 per cent or more of the oil wells are on the pump.

North Dakota and Utah stand alone as states that produce most of their oil from flowing wells rather than pumpers. Both states are young oil states and it will be many years before we see a significant upswing in the number of pumping wells added each year.

In general, most states will add fewer pumpers this year than last, reflecting the anticipated slight decrease in over-all drilling. Probably the decrease will be less than 5 per cent.

Half of pumpers in two states

State—	All oil wells in state Per cent: Artificial lift	Flowing	Forecast: number to go on pump in 1958
Alabama	98	2	25
Arkansas	95	5	467
California	97	3	1,505
Colorado	91	9	136
Florida	100	..	..
Illinois	99	1	1,080
Indiana	99.6	0.4	263
Kansas	99.8	0.2	1,980
Kentucky	100	..	530
Louisiana	58	42	1,273
Michigan	90	10	184
Mississippi	80	20	131
Montana	99	1	191
Nebraska	97	3	251
New Mexico	57	43	871
New York	100	0	191
North Dakota	35	65	99
Ohio	100	0	603
Oklahoma	97	3	3,048
Pennsylvania	100	0	169
South Dakota	100	0	1
Tennessee	100	0	0
Texas	73	27	10,530
Utah	35	65	83
West Virginia	100	..	89
Wyoming	93	7	336
Others	...	..	5
Total	...	...	24,041



Industry must watch three fronts

. . . any one of which could stage a sortie aimed at harassing the beleaguered oil industry

WASHINGTON this year, for the oil industry, will take on some of the less-amusing aspects of a three-ring circus.

It will have to watch with equal sharpness Congress, the courts and the federal departments.

. . . What Congress does with major oil bills now before it will affect the industry's profits, policies, and practices.

. . . A number of issues of high importance are involved in cases pending in the federal courts.

. . . Questions on research, leasing, and military buying await action in government offices.

The oil and gas branches of the industry each have one vital issue and several of only slightly less importance to follow.

Import control is the big issue for the domestic oil producers. For the gas branch it's relief from public-utility type of federal control.

There were a number of important oil developments in Washington in 1957. But few of them occurred in Congress. For the most part, they were the actions of the administration and the courts.

Congress probed deeply into many aspects of the industry. The European oil lift, supplier-retailer relations and price wars, military land grabs, and naval petroleum reserves were among the subjects studied.

But Congress contented itself with passing laws controlling the seizure of potential oil lands by the Defense Department and providing for oil and gas leases under navigable waters in Alaska. The highly important Harris gas bill got no further than hearings and a favorable report by the House commerce committee.

There was more activity in the Justice Department than on Capitol Hill.

A number of grand juries were called and are now investigating a wide variety of oil and gas matters.

Suit was brought to kill the merger of two big pipeline systems—El Paso Natural Gas Co. and Pacific Northwest Pipeline Corp.

A start was made toward getting trial of the long-standing West Coast suit. Major companies there face a variety of charges, all adding up to attempted restraint of trade and monopoly.

Several suits were filed charging oil pipelines with violation of the 1941 Elkins Act consent decree which limited distribution of earnings to 7 per cent. More such suits are being studied.

All of these will make legal news this year. But oil and gas issues already hold a prominent place on court calendars.

The big event of the year was the curbing of crude imports. First applied to the area east of the Rocky

A SAFE PREDICTION . . . Hundreds of oil men will make hurried trips to Washington in 1958, as threats arise, and will present oil's side on various issues, to committees and groups headed by such figures as . . .

CAPT. M. V. CARSON, JR.
. . . riding herd on imports

SEN. OREN HARRIS
Congress will act on his gas bill

JEROME K. KUYKENDALL
FPC chairman, re gas rates

Mountains, a voluntary import control program was extended last month to the West Coast states.

The results of this effort to keep imports in proper "supplementing" relation to domestic production through the first quarter of this year will largely determine whether Congress will be asked to write new terms into the Trade Agreement Act.

The trade law is due to expire next June 30. The administration is asking for a 5-year extension. Many in and out of the industry see in its oil-import controls an effort to ease the opposition to this, based in part on charges that the Government has ignored provisions aimed at protecting domestic industries.

Domestic producers are pleased with the import program, as evidence of the administration's concern with the problem. But some believe it should be backed up by a clause in the trade act to compel compliance. Others hold that if it is to succeed it must be broadened sooner or later, to take in residual fuel and refined-product imports.

Congress is expected to extend the act, but for less than the 5 years asked by President Eisenhower. And it is likely to deny authority he asks to reduce tariffs by another 25 per cent over the 5-year period.

If the oil-import program lags, Congress may be asked to write quotas or other formal controls into the law. The latter might take the form of an increase in the import taxes.

Congress also will act on the Harris gas bill. But the fate of the measure to give independent producers relief from federal control is highly uncertain.

The coal interests have made it clear that they will oppose the bill unless it is rewritten to ban industrial gas sales at below-cost prices.

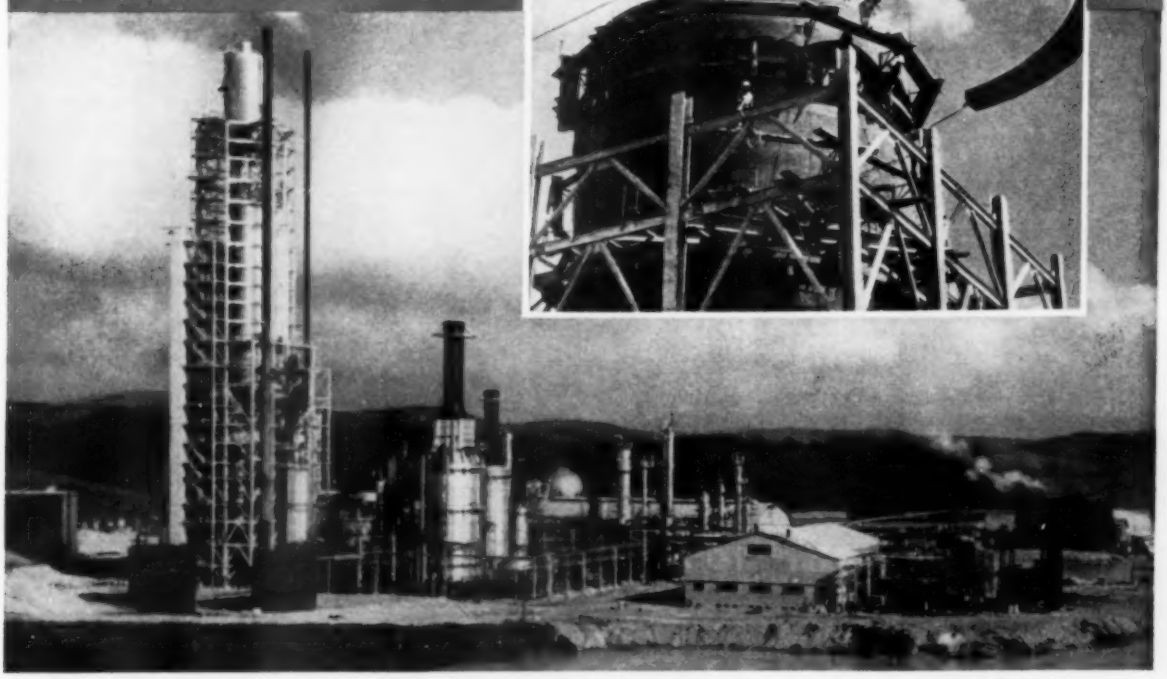
The pipeline companies say they cannot accept this demand, which would cut deeply into their summer volumes. But without the support of the coal-state delegations the Harris bill could well be defeated in this, an election year.

The decision will be made on the House floor. The Senate did not consider the bill at all last year. It will not do so in 1958 unless it comes over with approval by the House.

The depletion allowance again will be the subject

Brazilian Refinery gets LARGEST TCC UNIT

CB&I ERECTS FIRST TYPE 120 UNIT AT CAPUAVA REFINERY



Top: An air duct section for the TCC kiln being raised into place.

Bottom: General view of Capuava Refinery.

• At Capuava, north of Sao Paulo, Brazil, a main fractionating tower and the *first* type 120 Thermofor unit built was erected by CB&I in cooperation with their subsidiary, Sociedade Chibridge de Construcoes, Ltda. Both units were fabricated at our Greenville, Pa. plant and furnished through Hydrocarbon Research, Inc., New York, for Refinaria e Exploracao de Petroleo "UNIAO" S.A. The refinery has a crude capacity in excess of 20,000 bbls. per day.

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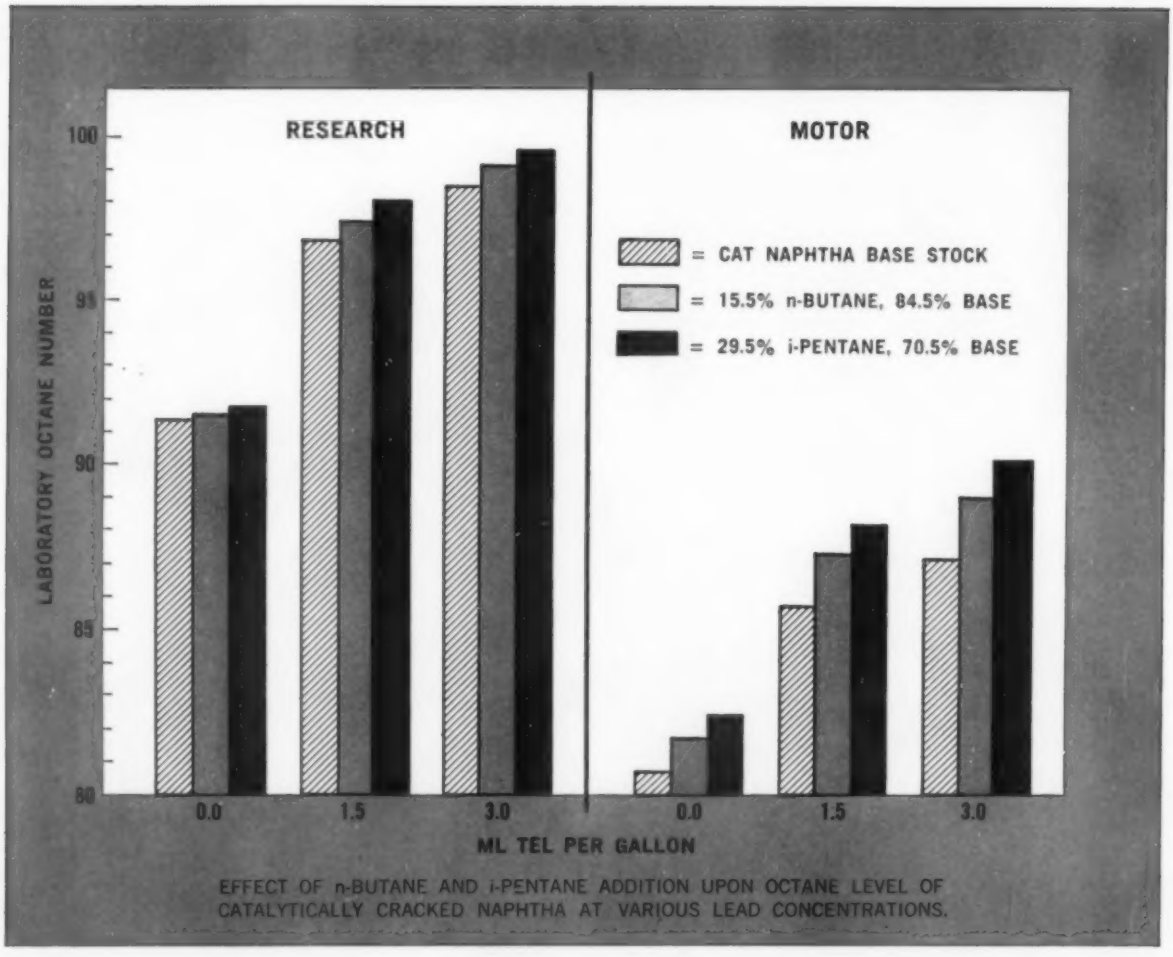

EFFECT OF n-BUTANE AND i-PENTANE ADDITION UPON OCTANE LEVEL OF CATALYTICALLY CRACKED NAPHTHA AT VARIOUS LEAD CONCENTRATIONS.

Ethyl Research Makes Precise Study of Butane and Pentane Blending

AT TODAY'S high-octane levels, the use of gasoline blending components in the most economic manner has taken on an ever-increasing importance to the refiner. One phase of refinery blending which has commanded continuous interest is the addition of light hydrocarbon agents to gasoline stocks for vapor pressure adjustment to yield finished motor fuels.

The best economic use of available pressurizing agents is determined to a great extent by their volatility and octane blending characteristics in various refinery stocks.

Thus, in order to establish best conditions for the pressurization of gasoline, accurate knowledge of the blending characteristics of those components employed as volatility correctors is required. Ethyl Corporation's refinery technologists can assist you in determining the most economical use of your pressurizing stocks.

For example, in a recent program, a refiner wanted to know the blending octane qualities of normal butane and isopentane when used individually as vapor pressure correctors in three base stocks—alkylate, catalytic reformate, and catalytically cracked naphtha. The objective was to find the break-even economic values of these agents as blend stocks through the use of correct blending qualities.

Blending Carried Out Under Refrigeration

Due to the critical nature of butane and pentane concentration, all blending operations were conducted in a refrigerated room (ambient air temperature, 30-35°F.) to minimize loss of agent, particularly that of n-butane. Blending was carried out on a weight basis in order to give the percentages desired.

Operations were designed to obtain representative samples for analysis and to minimize loss of material from closed containers after samples had been taken.

Exact Concentrations of Pressurizing Agents Determined by Vapor Fractionation

An accurate knowledge of the concentration of pressurizing agent in a base stock both before and after blending was needed to calculate reliable blending octane values.

Suitable techniques were developed for the exact determination of butane and pentane percentages by the use of gas chromatographic apparatus available at Ethyl's Detroit Research Laboratories.

Statistical Design Used in Obtaining Engine Ratings

Triple Research and Motor ratings were conducted on each fuel at TEL levels of 0.0, 1.5 and 3.0 ml per gallon. In order to insure completely independent determinations, each rating was conducted on coded samples which were rated in a pre-established sequence. The day-to-day variation in the CFR engine was avoided by rating all the samples on one base stock during one day's operation.

Gas chromatographic apparatus determines exact concentrations of pressurizing agents in base stock.

Engine ratings were made according to a statistical design in order to assure reproducible results. The standard deviation for the overall program was 0.20 octane number for the Research and 0.39 for the Motor method, showing good replication.

Laboratory Results Yield Octane Blending Data

Typical results of this study are shown in the bar chart on the opposite page, wherein the effects of n-butane and i-pentane additions upon octane level are shown for catalytically-cracked naphtha at various lead concentrations. From these results, the Research and Motor octane blending values have been calculated and are compared in the table (below).

At the maximum practical concentrations employed, i-pentane and n-butane possess essentially the same Research octane blending qualities at 0.0 and 1.5 ml TEL per gallon, while n-butane excels at the 3.0 ml TEL level. In every case, however, n-butane exhibits higher Motor octane qualities than does i-pentane.

Thus, while the two agents are about equal with regard to Research octane effectiveness at the percentages employed, n-butane would be preferred for this base stock when the maximum Motor octane effectiveness per quantity of agent added is an important factor.

Armed also with blending octane values derived for alkylate and catalytic reformate, the relative economic value of n-butane versus i-pentane for blending can be ascertained on the basis of octane efficiency for the refinery stocks in question.

The above program was designed primarily to show the effects of n-butane and i-pentane at concentrations approaching the Reid Vapor Pressure limits of the CFR engine. While some indication of the effects at intermediate percentages can be gained, exact blending values for a particular fuel at a given pressurizing agent concentration must be obtained by individual laboratory evaluation.

The data obtained from this type of study also permit the determination of blending Reid Vapor Pressure values for the pressurizing agents in question in various gasoline stocks.

BLENDING OCTANE VALUES OF n-BUTANE AND i-PENTANE IN CATALYTICALLY CRACKED NAPHTHA

Volume % * Agent in Base	Research O.N. @ ml TEL			Motor O.N. @ ml TEL		
	0.0	1.5	3.0	0.0	1.5	3.0
15.5% n-butane	92.1	100.3	102.2	86.8	95.3	98.4
29.5% i-pentane	92.3	100.2	101.5	86.4	93.6	96.7

Maximum practical concentration.

How Ethyl Research is helping you

This study is another example of the professional services available to the refiner through Ethyl Corporation's Refinery Technology Program.

Continuous Research by Ethyl Engineers has produced significant developments and valuable information on all the phases of refining that affect octane quality.

Results of this work are helpful to refiners and can frequently be applied to your specific refining situation by our Refinery Technology staff.

For further information on Ethyl Research services, just call your Ethyl Representative. He will be glad to arrange an appointment for you.

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2600 Cajon Road, San Bernardino, Calif.

of much talk in the Capitol this year. It will probably be made the springboard for another attack on the industry. An effort will be made to keep it from becoming an issue. But if it does, it may be compromised by cutting or dropping entirely the allowance on foreign production while retaining the 27½ per cent rate on domestic output.

On the other hand, chances of tax reductions have practically been ruled out. The administration wants another year's extension of the now almost permanent "temporary" 52 per cent rate of corporate income.

Tax relief for individuals will be urged by some congressmen, largely to get a political asset for their campaigns for reelection. But many believe that the way will be paved this year for tax hikes in 1959 to raise money for the stepped-up military program.

Other questions which Congress will study:

Highways . . . Rising costs of labor and materials threaten to up the 35-billion-dollar price tag for the 13-year road program. How to finance the increased cost is a problem Congress soon will have to face, but will probably bypass this year.

Naval oil reserves . . . Congress last year ruled that the Navy could look for oil only on land specifically set aside as a naval petroleum reserve. It may take the sting out of that edict this year by turning San Nicolas and two adjacent islands off the California coast into a reserve. The move is backed by Rep. Carl Vinson, of Georgia, chairman of the House armed services committee.

Good faith . . . Efforts to overturn the Supreme Court decision in the Indiana Standard "Detroit case" will hinge largely on the court's second ruling on the issue of whether the meeting of competition in good faith is price discrimination. Opponents claim they can defeat the measure.

Synthetic fuel . . . A new research program on oil from shale may be approved. The Navy wants to explore the possibilities of developing a new supply of fuel oil from the vast reserves of shale in the Rocky Mountain area. The Navy itself would not make the studies. They would be made by a private organization, under contract.

A number of cases highly important to the industry are pending in the federal courts. But interest will center on the Supreme Court.

The Government's suit to limit Louisiana to a 3-mile boundary in the Gulf of Mexico was broadened by the court last year to bring in all of the gulf states.

Atty. Gen. William P. Rogers is showing little of the crusading spirit in which the suit was pressed by his predecessor, Herbert Brownell, Jr. He has said that he will give the court "all" the facts, both for and against the 3-league boundary claimed by the gulf states, including letters of President Eisenhower favoring that limit in the case of Texas, at least.

The gulf states, denying the Government's arguments, contend that they legally are entitled to a 3-league limit. But they claim that regardless of whether the boundary is 3 miles or 3 leagues, they are entitled to the submerged oil and other resources out to the latter line, and that could be the basis on which the issue is settled.

The Federal Power Commission, joined by a number of pipelines, has asked the court to review the Memphis case. In this case, a District of Columbia appeals court held that FPC may not accept a pipeline's plea for rate increases unless all customers have specifically agreed to the new rates.

Unless the Supreme Court or Congress overturns that ruling, pipeline companies may have to return more than 203 million dollars which they have collected under suspended rate increases. And they will be barred from quick relief in periods of rising costs.

But the FPC, working with the industry in the Memphis case, is working against it in another. It has made an issue out of what started as a private suit by Cities Service Gas Co. challenging the Kansas minimum-price law for gas. It asked the court last month to ban the setting of minimum field prices by the states, charging it invades its "exclusive" jurisdiction.

Another issue which will be watched closely is that of FPC authority over wellhead sales. The matter already has been put before the Supreme Court by Shell Oil Co. Continental Oil Co. raised the question last month before a federal appeals court.

Government agencies also have some important oil questions to deal with:

Military . . . Defense Department cutbacks in oil buying last year spelled trouble for refiners who had counted on their contracts with the Government. Whether the cutback will be continued, deepened, or relaxed this year will depend on several factors—the international situation, advances in the missile program, etc.—over the next few months. But no material changes in specifications for military fuels now appear likely.

Pipelines . . . Pipeline companies covered by the 1941 Elkins Act consent decree would like to be able to distribute earnings of more than the 7 per cent to which they are now limited. The Justice Department, however, appears cool to the idea. Its suits already filed against several pipelines include charges that they distributed more than 7 per cent to their oil company owners.

Leasing . . . No changes in the leasing laws are expected to be asked by the Interior Department. But at the Capitol another effort may be made to pass a bill offered annually for several years, making all leases subject to competitive bidding. Interior officials, however, feel that the noncompetitive lease on unproven lands is a spur to exploration and do not favor the change.

Another sale of leases on the Outer Continental Shelf may be staged this year. But the economic position of the industry, the none-too-happy experience of some operators on the shelf and uncertainty over state boundaries are likely to put off another sale until after the Supreme Court acts in the Louisiana case.

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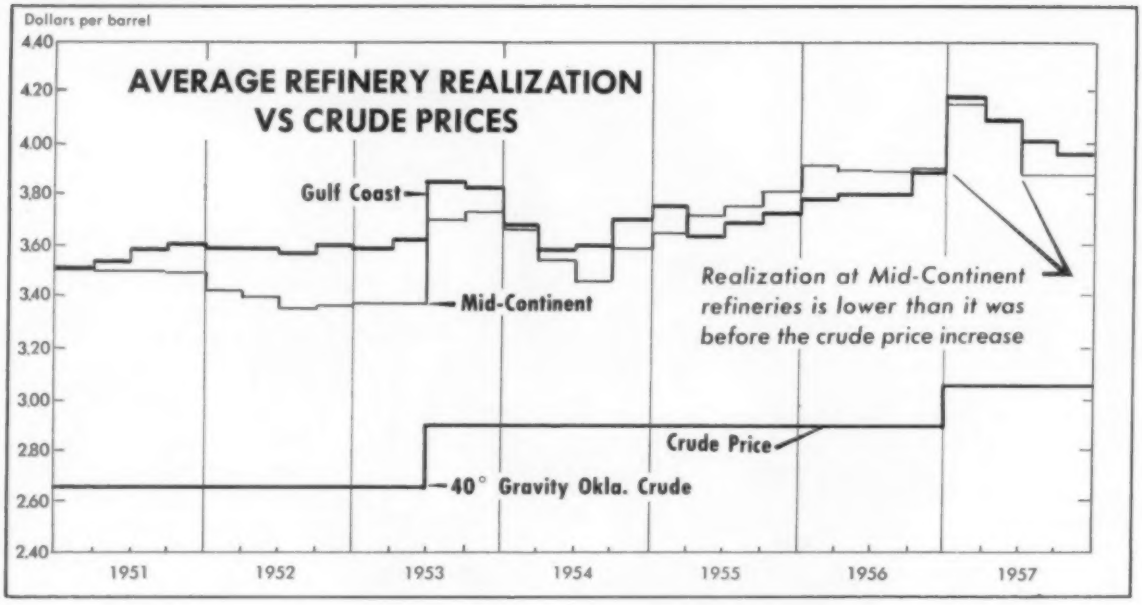


Suez closing forced altered pattern, but

Refiners didn't cash in on shortage

- Gasoline hit by abnormal export demand
- Crude prices up, octane gains two numbers, but price hikes failed to stand up
- Resid may be priced out of part of its market

AMERICAN REFINERS gained little from the boost in product sales during the shortage period created by the closing of the Suez Canal. And, for the most part it was their fault.

Increases in product exports in the last quarter of 1956 and the first 6 months of 1957 amounted to about 54,000,000 bbl. Also, most of these products brought good prices. But, the picture is not all sunny and bright.

To meet the demand some refiners had to resort to unusual and costly shipments from areas that do not normally furnish products for export. This was one cost item the refiner could do little about. But, this cost was not the profit-robbing villian in the tragedy.

The refiners' failure to trim product output to meet the changing pattern of demand probably cost them much more than the profits on export sales.

Even if refiners made as much as 20 cents a barrel on the extra 54,000,000 bbl. exported during the shortage period, the total would be a little less than $11,000,000. For a portion of the export period, refinery prices were up a little, but most of the increases came after the crude-price advance. The period of better product prices didn't last long.

Gasoline, representing almost half of the output at Gulf Coast refineries, was adversely affected by the abnormal export demand. Regular gasoline on the Gulf Coast cargo market was selling for 11.25 cents a gallon in the summer of 1956.

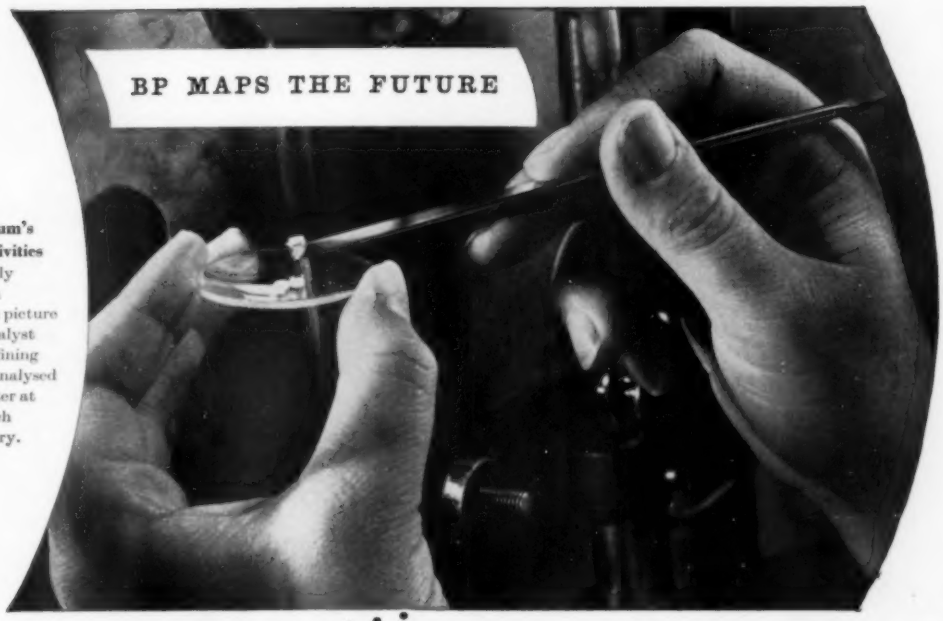
The quality of the gasoline was raised two octane numbers. There was a crude-price increase of 25-45 cents a barrel. Other refinery costs increased. And yet, for the last 3 quarters of 1957, the Gulf Coast price ranged between 11.25 and 10.75 cents a gallon.

Gulf Coast No. 2 fuel was selling at the end of 1957 for the same price posted in the fall of 1956 before the Suez Canal was closed. Kerosine prices were down 0.75 cent.

Low prices resulted from excessive stocks. Burdensome stocks can be charged to unneeded refinery runs.

Refiners produced a little over 1,600,000,000 bbl. of products in the last half of 1957. Even if the price drop from overproduction amounted to only 10 cents a barrel, the total loss would amount to $160,000,000.

The chart on refinery realization shows this gap between the crude-price increase and product prices under the influence of overproduction.



The story of British Petroleum's world-wide activities begins, naturally enough, here in Britain. In this picture a sample of catalyst for use in oil refining is about to be analysed in a spectrometer at the BP Research Station, Sunbury.

How will these hands shape tomorrow's motoring?

WHOSE HANDS ARE THESE? They are the hands of a chemist at the research station of The British Petroleum Company at Sunbury-on-Thames. One of nearly 1,000 BP research workers whose main task is to conjure more and better products from one single substance—crude petroleum.

Among the many different users of oil products, no one has gained more than motorists and motor-cyclists from the work of these men and women. No one has more to gain in the future. To quote one example, BP Energol 'Visco-static', the all-weather motor oil which reduces engine wear by 80%, was a recent Sunbury triumph The result of many months of patient research.

In 1917 Sunbury Research Station began with a single modest house. Now it occupies 39 acres and is still expanding. Besides its laboratory and development work, Sunbury carries out the most exhaustive proving-tests of BP products and processes. The latest major addition to its resources is a motor fuels engine-test laboratory, where cars can be tested at speeds up to more than 100 m.p.h. under temperature and humidity conditions equivalent to the most extreme tropical climates.

Thus, constant research ensures the supreme quality of BP products for use all over the world, and even more efficient fuels and oils for the engines of tomorrow. At Sunbury, the future takes shape today.

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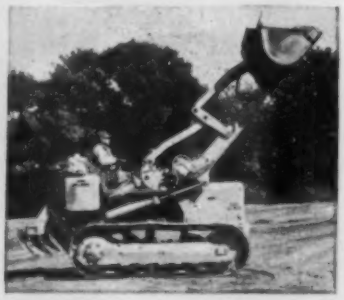
the TRAXCAVATOR'S  new...

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A NEW DIMENSION IN LOADER VERSATILITY

Note that refinery realization gained in both areas after the crude-price increase in the early part of January 1957. The chart also shows a general decline in realization, starting after the end of the first quarter. At the end of 1957, the Mid-Continent average was down to $3.87 a barrel. This was below the average for the fourth quarter of 1956, just before the crude-price increase.

Crude Prices

Humble Oil & Refining Co. announced crude price increases for all its areas, effective January 3, 1957. The increases ranged from 25 cents a barrel to 45 cents.

The 45-cent increase covered several types of crude along the Gulf Coast. These included low-cold-test crudes, mixed sweet crudes from Hastings and the Upper Gulf Coast, Refugio light, Refugio heavy, and Mirando.

Other crude buyers met the price increases in Humble's buying area and raised prices in other areas. In the period of confusion, some Mid-Continent and other inland crudes were raised 35 cents and later cut back to 25 cents.

Gulf Coast and Southwest Texas crudes were in a favorable position during the period of the Suez crisis. After the canal opened, some Gulf Coast refiners decided that product realization would not support prices they were paying for crudes in the area. They started trimming prices, mostly on crudes that had been boosted most in January. By the end of the year, practically all of the premiums above 25 cents were gone.

Early in October, crude buyers made adjustments in black Wyoming oil prices, reducing the heavy end by about 8 cents a barrel.

Several Arkansas crudes were cut 10 cents a barrel in October. Pennsylvania Grade crude moved up 20 cents in January but was cut back 23 cents a barrel late in July.

Sohio Petroleum Co. reduced its postings for Illinois basin crude 15 cents a barrel, effective December 10. Ashland Oil & Refining Co. and several smaller buyers met Sohio's reduction, citing competitive conditions and lower refinery profits.

. . . Some representative prices

Spot Market Quotations of Leading Suppliers

(Cents per gallon except dollars per barrel for residual)

GROUP 3

	Regular gasoline	Kerosine	No. 2 distillate	No. 6 residual
January	11.64-12.03	10.46-10.68	9.46-9.68	2.41-2.64
February	12.00-12.25	10.55-10.74	9.55-9.74	2.42-2.59
March	11.85-12.25	10.10-10.43	9.10-9.43	2.36-2.46
April	11.75-12.25	10.00-10.38	9.00-9.38	2.25-2.35
May	*11.82-12.32	10.00-10.38	9.00-9.38	2.25-2.35
June	11.61-12.11	9.79-10.27	8.79-9.17	2.12-2.29
July	11.25-11.75	9.64-10.14	8.64-9.07	1.86-2.10
August	11.39-11.75	9.50-10.00	8.50-9.00	1.85-2.10
September	11.50-11.75	9.50-10.00	8.50-9.00	1.75-2.00
October	11.50-11.75	9.50-10.00	8.50-9.00	1.64-1.85
November	11.50-11.75	9.50-10.00	8.50-9.00	1.60-1.80
December	11.44-11.75	9.69-10.13	8.69-9.13	1.60-1.80

*Regular raised to 89 octane.

GULF COAST

January	11.48-11.75	10.40-10.81	9.90-10.23	2.70-2.88
February	11.50-11.75	10.75-11.12	10.25-10.62	2.75-3.12
March	11.35-11.75	10.60-11.00	10.10-10.50	2.75-3.00
April	11.25-11.75	10.50-11.00	10.00-10.50	2.75-3.00
May	10.99-11.50	10.15-10.63	9.69-10.13	2.75-3.00
June	10.84-11.50	9.53-10.23	9.40- 9.82	2.71-3.00
July	11.22-11.72	9.06- 9.69	8.97- 9.50	2.58-2.89
August	11.25-11.75	8.75- 9.50	8.75- 9.50	2.50-2.75
September	11.25-11.75	8.75- 9.50	8.75- 9.50	2.50-2.75
October	11.19-11.62	8.75- 9.50	8.75- 9.50	2.50-2.75
November	11.00-11.25	8.75- 9.50	8.75- 9.50	2.50-2.75
December	10.81-11.25	8.75- 9.50	8.75- 9.50	2.50-2.75

Product Price Shifts

Residual-fuel markets change more with shifts in industrial production than other petroleum products. Also, residual accounts for a larger portion of demand in other countries than in the United States.

These two facts account for most of the violent fluctuations in heavy-fuel prices in the past year and a half. The Suez Canal was blocked on October 31, 1956, and pump stations in Syria of the Iraq Petroleum Co. were blown up 3 days later.

Oil men in this country were called on to help supply Europe with crude and fuels at a time when demand in this country was starting its normal winter climb. The scramble for heavy fuel pushed the Bunker C price up on the Gulf Coast. Some sales were reported as high as $3.00 a barrel.

Mid-Continent refiners were shipping heavy fuel to the Gulf Coast by tank car but had enough left over for demands from the normal North Central marketing area. Some inland refiners began to wonder what would have happened to residual prices if there had been no export demand. They got an answer to their question when the Suez Canal was opened at about the time the winter demand season ended in this country. Prices started dropping rapidly.

Group 3 residual prices did not increase, even with the start of the winter season in 1957. Quotations for normal northern movement remained at about $1.60 a barrel. Some material moved to the Gulf Coast at a net price of about $1.20 a barrel for the Mid-Continent refiner.

East Coast residual markets were soft throughout all of the last quarter of 1957. There were unconfirmed reports of discounts off the posted barge price of $2.95 up to the end of the year. Some marketers believe that residual has been priced out of a part of its market.

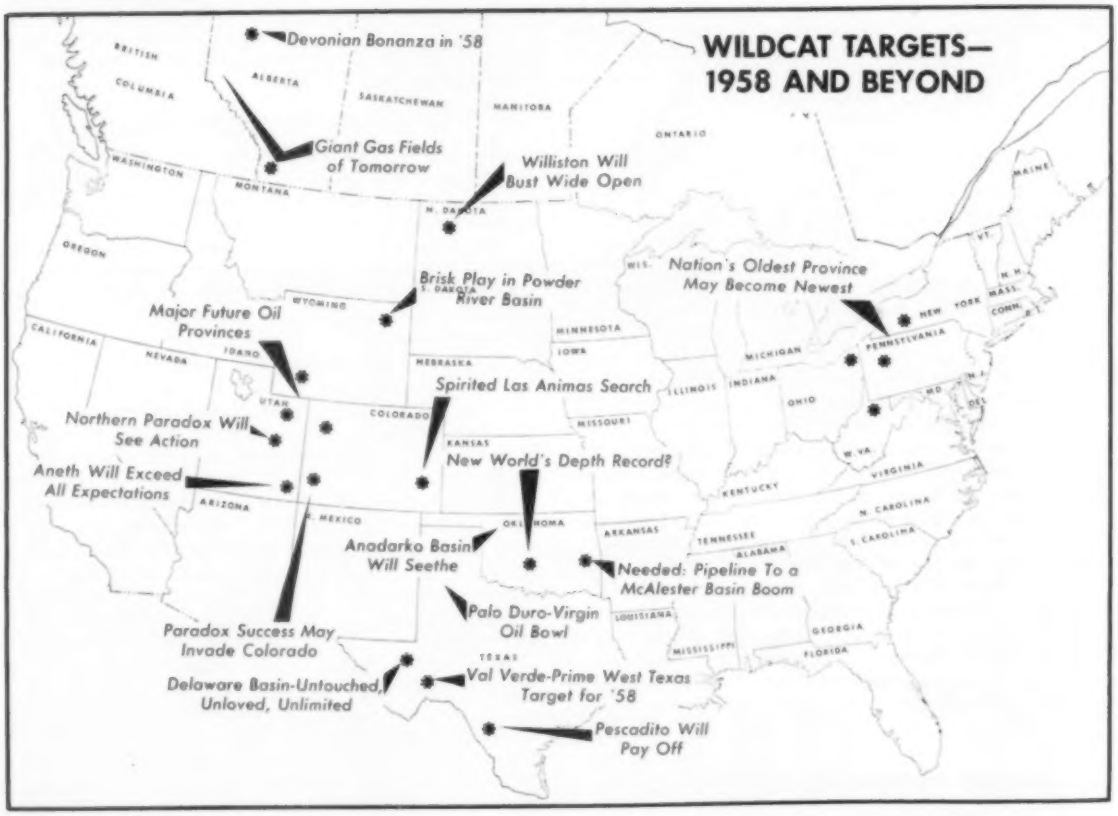
Lower prices for both gasoline and distillate fuels resulted from a combination of overproduction and disappointingly low demands.

Domestic demand for gasoline showed a gain of less than 2 per cent over 1956. There was no increase in middle-distillate demand. These unexpected trends, combined with moderate overproduction, softened almost all markets for clean products.

Posted New York barge prices for No. 2 fuel started the year at 10.65 cents a gallon. The price moved up to 11.65 cents after the crude-price increase but dropped to 11.15 cents as the summer-fill season started about the middle of May. This first drop was a normal seasonal change, but the skid continued. Quotations dropped to 10.65 cents in July and to 10.25 cents in August. The big indicator of the market strength was the fact that prices did not go up at the start of the heating season.

The gasoline market varied by areas with the Gulf Coast making the poorest showing. Spot cargo prices for regular gasoline on the Gulf Coast went about like this. The year opened at 11.25 cents a gallon with a raise to 11.50 cents after the crude-price increase. A gradual softening dropped the price to 10.75 cents by the first of June. There was a little firming during the summer months but the price was back down to 10.75 cents before the end of the year.

Petroleum markets for 1957 were influenced by a supply condition that could be described as "to much, too late."



We give you our "uplook"

. . . on what's ahead for exploration

A FORWARD LOOK in exploration is vital to our domestic oil industry. Looking back is fine for the historian, but looking ahead is much more important for the oil hunter. Therefore, on these and the next 13 pages, the Journal's exploration staff presents a very brief review of 1957 exploration achievements, spiced with bold-type predictions of what it sees ahead in 1958 and beyond. We call it **"the uplook."**

Many of these predictions are emblazoned on the map shown here. These are the major exploration targets that lie before the oil finder in the next few years. Any one of them might well be the scene of dramatic new discoveries in the months to come.

Boomtime in the Rockies . . . As a prime example of the triumph of perseverance over prejudice in exploration, take **the Paradox basin** of southeastern Utah. Many operators are frank to admit that "we had written off this basin as dry, pulled out all our crews, let our leases go." Not so Shell Oil Co. and The Texas Co. These two persistent explorers kept up their wildcat campaigns in the firm belief that Paradox was a comer. And the belief paid off. The Pennsylvanian reservoirs of southeastern Utah are the most important onshore addition to the nation's reserves in nearly a decade. The payoff has hardly begun. With nearly half a billion barrels of proved reserves already, Paradox can and will exceed all expectations in the next 5 years, and a billion-barrel province is in the making.

Look at **the Williston basin.** This one, born to production in 1951, started off in a burst of activity and expectation. Initial success was encouraging but did not live up to the expectation. Enthusiasm waned. So did drilling. So did discovery. But the amazing good luck of Canadians in southeastern Saskatchewan's part of the basin in 1955 and 1956 proved to be contagious.

"Antidote to pessimism, a slap at prejudice, a stimulus to thinking"

In 1957, the Canadian boom swelled and spilled over the international boundary into North Dakota. Williston operators took heart. Perhaps it was too early to write the Williston obituary after all. Drilling perked up. And Williston in 1957 had its most successful wildcat record yet. Here is a vast, scantily drilled province that is destined to "bust wide open" in the next few years, and it will eventually rival any major oil province in the United States.

Other Rocky Mountain basins that will bear close watching in the future are **Green River** and **Powder River** in Wyoming, **Uinta** in Utah, and **Piceance** in Colorado. All have had unusual activity (and success) in 1957. Oil breeds oil, and gas breeds gas. The initial if hesitant wildcat campaigns of the past year produced a score of significant hits. And more of the same is in the cards.

Of giants and of virgins . . . In the **Mid-Continent,** the accent is on depth. **The Anadarko basin,** after playing the role of a sleeping giant for years, finally began to stir in 1955. In 1956, it rumbled with triumph, and in 1957 it disgorged oil and gas in a multitude of new discoveries. Here is another great basin just beginning its career; a wildcat in Caddo County, Oklahoma, with a target depth of 24,000 ft. will sound the depths of the basin in 1958. Whether hit or miss, it is only the forebear of a parade of similar deep tests for this basin. Anadarko will seethe with activity in 1958, and for years ahead.

In southeastern Colorado lies a huge positive area that stands as a challenge to the drill. The long **Las Animas arch** stretches from northeastern New Mexico across southeastern Colorado northwestern Kansas, and into southwestern Nebraska. Long considered a "virgin exploration frontier" by the oil finder, Las Animas has begun a faltering payoff in the past 2 years. Two new gas fields and one oil strike (first for the arch) were scored in 1957; all were in Kiowa County, Colorado. Look for a spirited wildcat search along the length and breadth of Las Animas in months to come.

In the Texas Panhandle, Shell Oil Co. made oil history when it found the first oil in the vast virgin **Palo Duro basin.** Shell completed three oilers in 1957, all widely separated, on the east flank of the Bravo uplift in Oldham County. Here is a newly born oil province that should and must receive greater attention from oil hunters of the future.

Eastern Oklahoma and western Arkansas have watched the quiet growth of a major gas domain in **the McAlester basin.** Exploration has accelerated during the past 2 years, goaded on by one hit after another. Operators are building up reserves for the future, and should a major pipeline tap McAlester, a new era of drilling will lie before the industry there.

Targets for Texas . . . West Texans have plenty of reasons to be optimistic about future exploration. Like Oklahoma's Anadarko, West Texas' **Delaware basin** is a deep, deep challenge. Here is another smoldering giant of oil—a sedimentary bowl whose real potential is believed to lie beyond the capacity of present-day drilling tools. Shallow fields around its edges, and evidence of deeper promise have kept the Delaware at the top of the list of "Texas Targets for Tomorrow." Southeast of it, a shallower basin, the **Val Verde,** tempted wildcatters in 1957 and paid off with initial discoveries; these point to ever more active search in this subsidiary arm of the Permian basin province.

South Texas racked up a record in 1957 at Pescadito in Webb County. Here, Texas' deepest salt dome was proved when Ginther, Warren, & Ginther 1 Killam pierced the salt at 15,070 ft. The wildcat failed, but a second is on its way down, and we predict that drilling on this huge uplift, 10 miles in diameter, will hit the jackpot in 1958 or beyond.

A "some day" thing . . . Finally, no look at the future would be complete without a hopeful look at our oldest province, the kingdom of oil in the nineteenth century . . . **the Appalachian.** Here is a prolific source of shallow oil whose deeper potential lies almost untapped. Appalachian oil hunters have the greatest confidence in a "some day" return of industry attention to their region; when it comes, our oldest province could easily become the newest.

To climb a hill . . . This, then, is the uplook in U. S. exploration. It should serve as an antidote to pessimism, a slap at prejudice, and a stimulus to discovery thinking. Oil finding today is uphill work, it's true. But a cardinal rule of the mountain climber is "never look back." **The uplook** is fundamental for the oil finder in 1958 and beyond.

So much for targets . . .

What about techniques?

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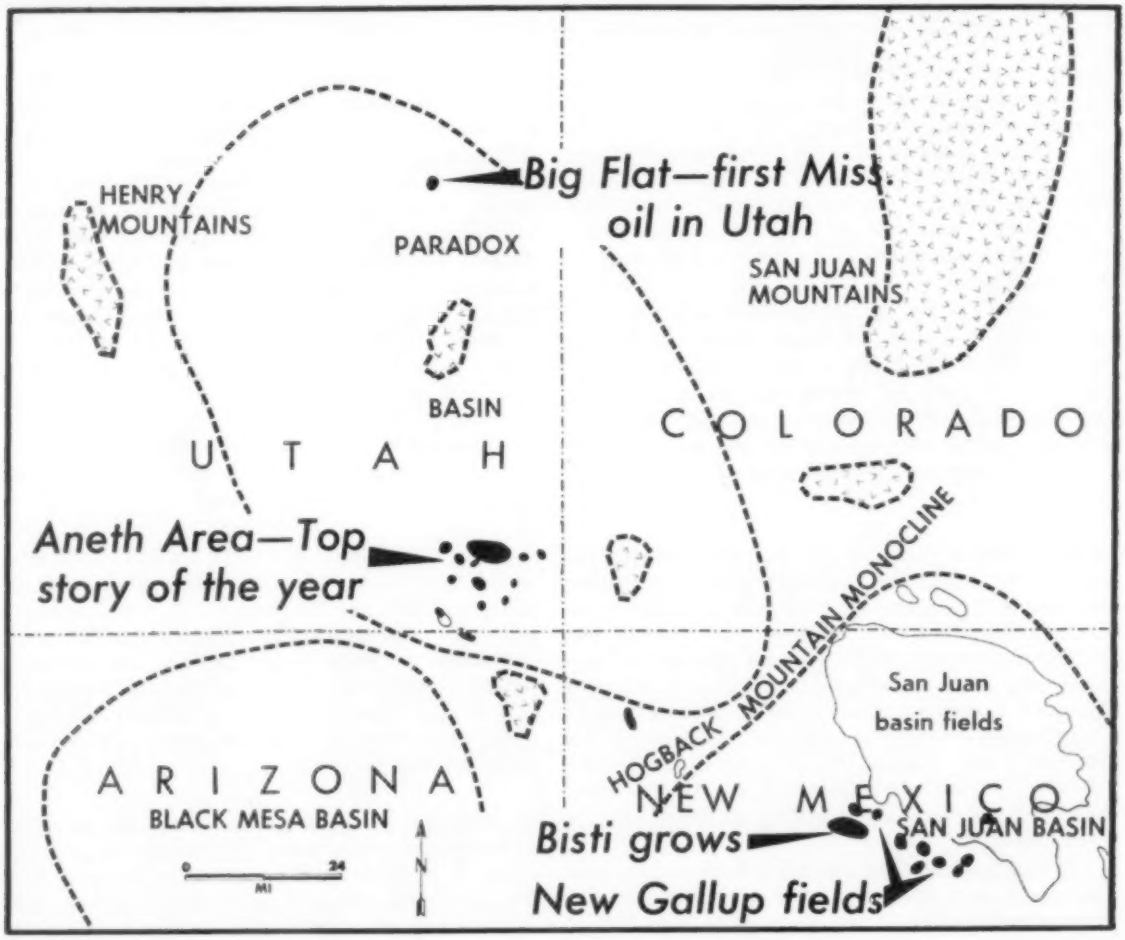

Paradox basin still a headliner . . .

and we predict — • Success will spill over into Colorado • Drilling campaign for northern Paradox • Black Mesa basin interest will swell • San Juan gas basin will be ringed with oil fields

THE FOUR CORNERS region of southeastern Utah and northwestern New Mexico retained its lead as the top exploratory news maker of 1957. Nine new oil fields were opened in the San Juan County, Utah, portion of the Paradox basin, while the San Juan basin oil search netted 15 new fields, most of them producing from the Gallup-Cretaceous sand. At year's end with pipeline outlet available the Aneth area fields were busy with development wells.

Paradox basin . . . The Aneth area stole the Four Corners wildcat prize for 1957 once again. New fields opened in the basin include: Hatch Unit, Turner Bluff, Cahone Mesa, Gothic Mesa, Tohonadla, White Mesa McElmo Creek, Chinle Wash, and a new field between White Mesa and Desert Creek, yet unnamed (see Fig. 2). As is the case with all Paradox basin wells to date, the initial potentials of these discoveries were high. Production is from rocks of Pennsylvanian-Paradox age.

Shell Oil Co. established the basin's westernmost oil production at its 1 Tohonadla in June. The Paradox discovery flowed 1,450 bbl. of oil per day on 48/64-in. choke. The northernmost Paradox discovery in San Juan County is the recent Hatch Unit strike, which although not as prolific as its brethren strikes in the basin, did open a vast area to oil hunting between it and Aneth field itself.

Pan American Petroleum Corp. opened Turner Bluff field west of Recapture Creek at its 1 Martha Featherstone. This Ismay (Paradox) strike flowed 192 bbl. of oil per

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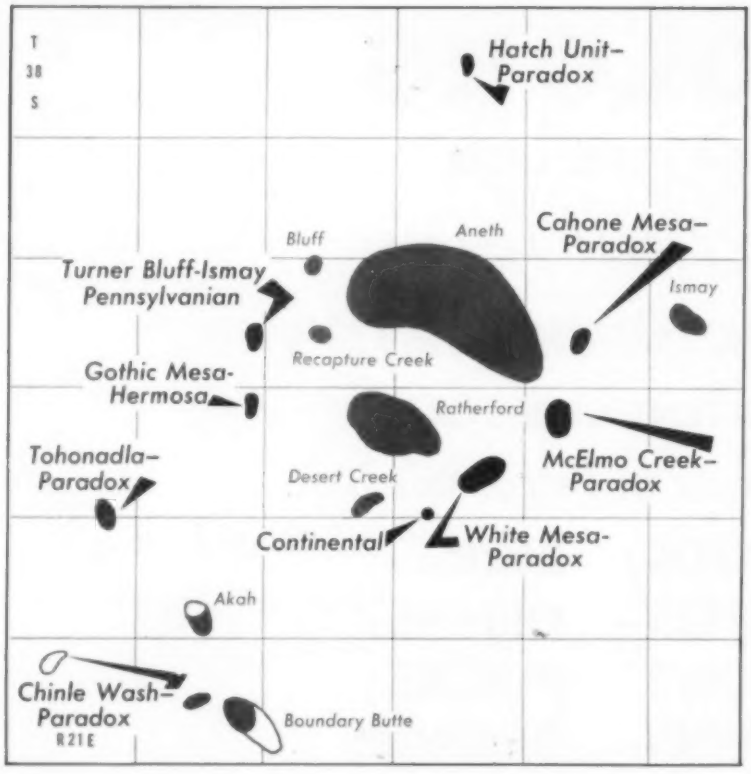
ANETH AREA



day on completion through 20/64-in. choke. Directly south of Turner Bluff, Gulf Oil Corp. opened an Hermosa-Pennsylvanian field at Gothic Mesa. This one flowed 263 bbl. per day on 12/64-in. choke.

Far to the southwest of Aneth field Chinle Wash gas field was opened at U. S. Smelting 1 Ohio-Navajo. This Paradox well flowed 9,735 M.c.f. of gas per day. Continental Oil Co. filled in part of the gap between Aneth and Ismay fields on the east side of the basin at 1 Navajo "H." The Paradox well flowed 192 bbl. per day. One of the best new strikes in the area is Carter Oil Co. 1 Navajo 114 well, field-opener for McElmo Creek. This one flowed 2,330 bbl. of oil per day on a 6-hour test through ¾-in. choke.

South of Aneth field Davis Oil Co. opened White Mesa field at Navajo "A." The well flowed 1,680 bbl. per day on 1-in. choke. Later offsets by other companies quickly made this an important Paradox basin field. A recent strike by Continental Oil Co. between White Mesa and Desert Creek proves up another area for Paradox exploration.

. . . Northside Paradox. First Mississippian oil production in Utah was opened at Big Flat near the north rim of the basin by Pure Oil Co. The well's greatest importance is its removal from any similar production. Nearest Mississippian oil is in Wyoming. The wildcat stirred considerable interest in the potentialities of the northern rim of the basin. Several wells are now working in the area looking for success like that at Big Flat.

San Juan basin . . . The Gallup sand is still the vote-getter in this northwestern New Mexico basin. Events of the year are all centered around its success. The Bisti trend grew to the southeast, and an entirely new Gallup trend built up between Bisti and the huge San Juan basin gas fields to the north. One Gallup oil pool was opened inside Blanco gas field itself.

Gas exploration continued strong in the basin, and everything points to more and more gas fields. But the big story that will be coming out of the San Juan basin in the next few years (it is now under way) is myriad oil fields around the gas-producing area. The Gallup sand will be in for increased exploration in 1958 and more trends can be expected southeast of Bisti.

As to the future . . . Important exploratory events can be expected out of the Four Corners region in 1958.

. . . In Arizona. The Black Mesa basin in the northeastern part of the state has only three small gas-producing areas. Interest is growing in the possibilities of oil and gas along the northeast rim of this basin, and the drill will enter here this year.

. . . In Utah. Aneth area fields will continue to grow at an even faster clip than in 1957 due to pipeline outlet. The blank spaces between Paradox basin oil fields will begin to fill in as more discoveries dot the map. Areas to watch in the Paradox are across the line into southwestern Colorado where very little success has been met to date, southeast of the Aneth trend itself in Utah, north of Aneth to Hatch and beyond, and west of Turner Bluff, Gothic Mesa, and Tohonadla.

. . . In New Mexico. This will be the third year for oil exploration on a big scale in the San Juan basin. Watch for new fields around the gas areas of San Juan County.

Williston comes back . . .

and we predict — • Tempo of pre-Madison drilling will quicken • Border counties play will rival Saskatchewan • Increased activity in Southwest

THE WILLISTON BASIN suddenly blossomed with new discoveries that may well place it ahead of the Paradox basin in industry favor in 1958. Wildcat success in this huge international oil bowl in 1957 set new records for its short producing life. Centers of wildcat interest were northeastern Montana, southwestern North Dakota, Beaver Lodge field, Burke County, and Southeast Saskatchewan.

. . . Outlook. The year's most important exploratory happening was the discovery of oil in the Silurian, Devonian, and Ordovician at Outlook in Sheridan County, northeastern Montana.

Amerada Petroleum Corp. set this play off at its 1 Tange early in the year. That Silurian discovery was

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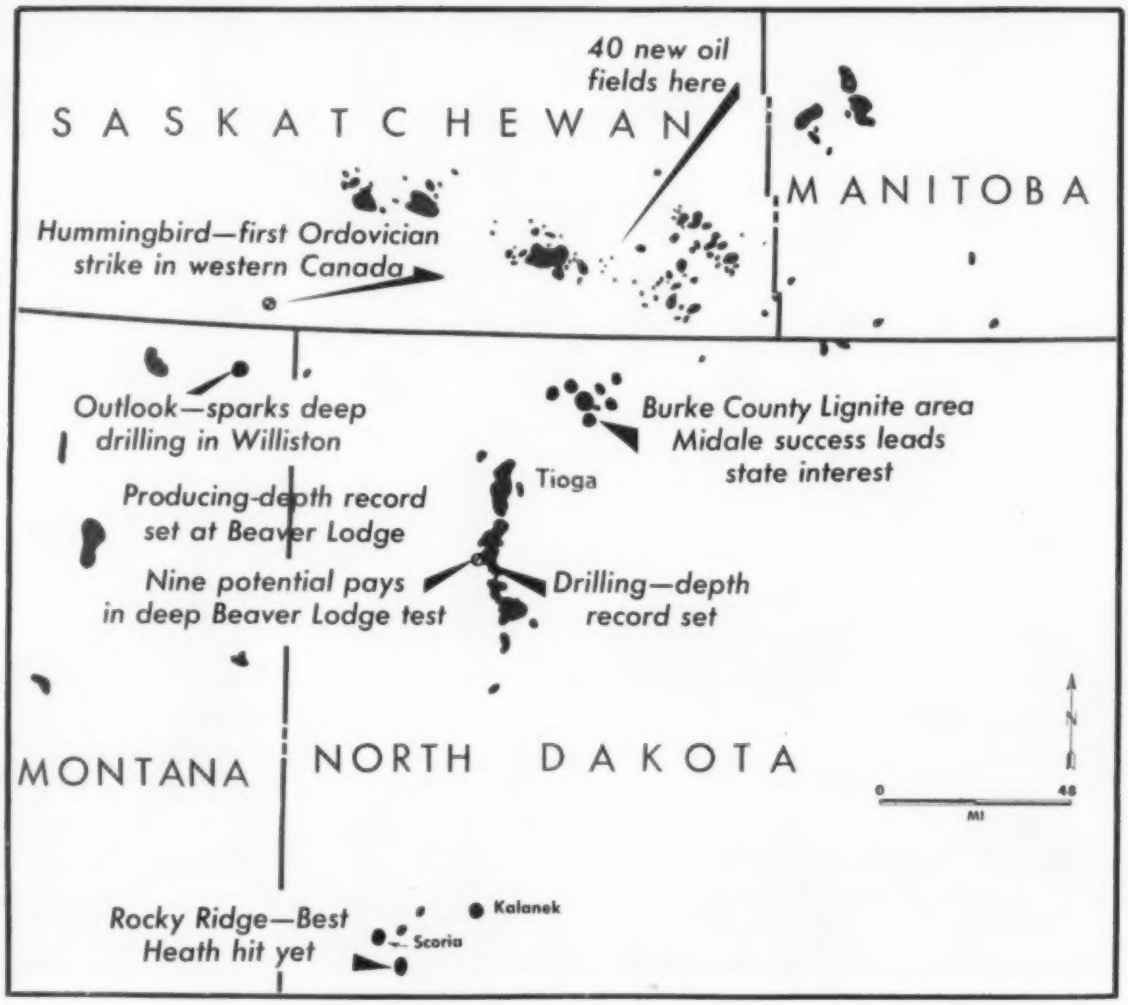
WILLISTON BASIN



finaled flowing 2,742 bbl. of oil per day. Since that time the Outlook area has grown in all directions with good wells not only in the Silurian, but also in the Devonian and Red River Ordovician.

The Outlook play may spill over into an oil-barren sector of Saskatchewan as a result of Ordovician showings at Imperial Oil, Ltd. 1 Hummingbird wildcat, 25 miles northeast of the Montana field. If this well is successfully completed, it would open first Ordovician production in western Canada. There are few Ordovician rocks in Alberta, but they are widespread in the Williston basin portion of Saskatchewan and Manitoba. If Hummingbird is not completed as a producer, it will still serve as a spark for increased deep drilling in this section of the province.

... **Rocky Ridge.** Northern Pump Co. finished this Heath-Mississippian discovery in Billings County for 1,224 bbl. per day early in the year, stirring wildcat fever in southwestern North Dakota. The discovery well was successfully offset, and two new fields were discovered in the vicinity. Amerada 1 Scoria Unit flowed oil from both the Heath and Madison. In Stark County, near Dickinson, Leach Oil Co. completed its 1 Kalanek as a Madison discovery for 140 bbl. per day.

... **Beaver Lodge.** Important new oil reserves were added to this North Dakota milestone field. However, the most significant wildcat news here was the accent on deep wells. Amerada 9-A Unit wildcat set a new depth record for the state at 14,828 ft. The 1 Iverson-Nelson Unit tapped at least nine potential pay zones on its way down to ultra-deep levels. The well is still active and could possibly set a producing-depth record for the state if completed in the lower pay zones. The 1 Boe Olson Unit set a definitely new producing-depth record for the state with condensate flowing from the Silurian at 11,584 ft.

New fields were found at the north and south ends of the Nesson anticline in 1957, as well as in the middle, proving that this first Williston oil guidepost is far from being fully tapped.

... **Burke County.** This border County in the northern part of North Dakota fired up the real wildcat news story of the year for the state.

Williston basin explorers have long hoped for the tremendous success of Southeast Saskatchewan's Mississippian play to move across the border into North Dakota. Last summer it happened at Lignite in Burke County. Northwest Oil Drilling Co. 1 Ed Bunting came in for 225 bbl. of oil daily from Midale-Mississippian pay. The field now boasts more than a dozen good Midale producers with development wells sprouting up in all directions. After Lignite's birth, new exploratory fever spread through the counties east of the Nesson anticline.

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AUTOMATIC OPERATION eliminates the need for involved calculations and the application of tension from the surface. Since the Anchor is designed to allow only downward movement of the tubing, the exact amount of tension required to eliminate both breathing and buckling is automatically applied by the natural elongation of the tubing itself.

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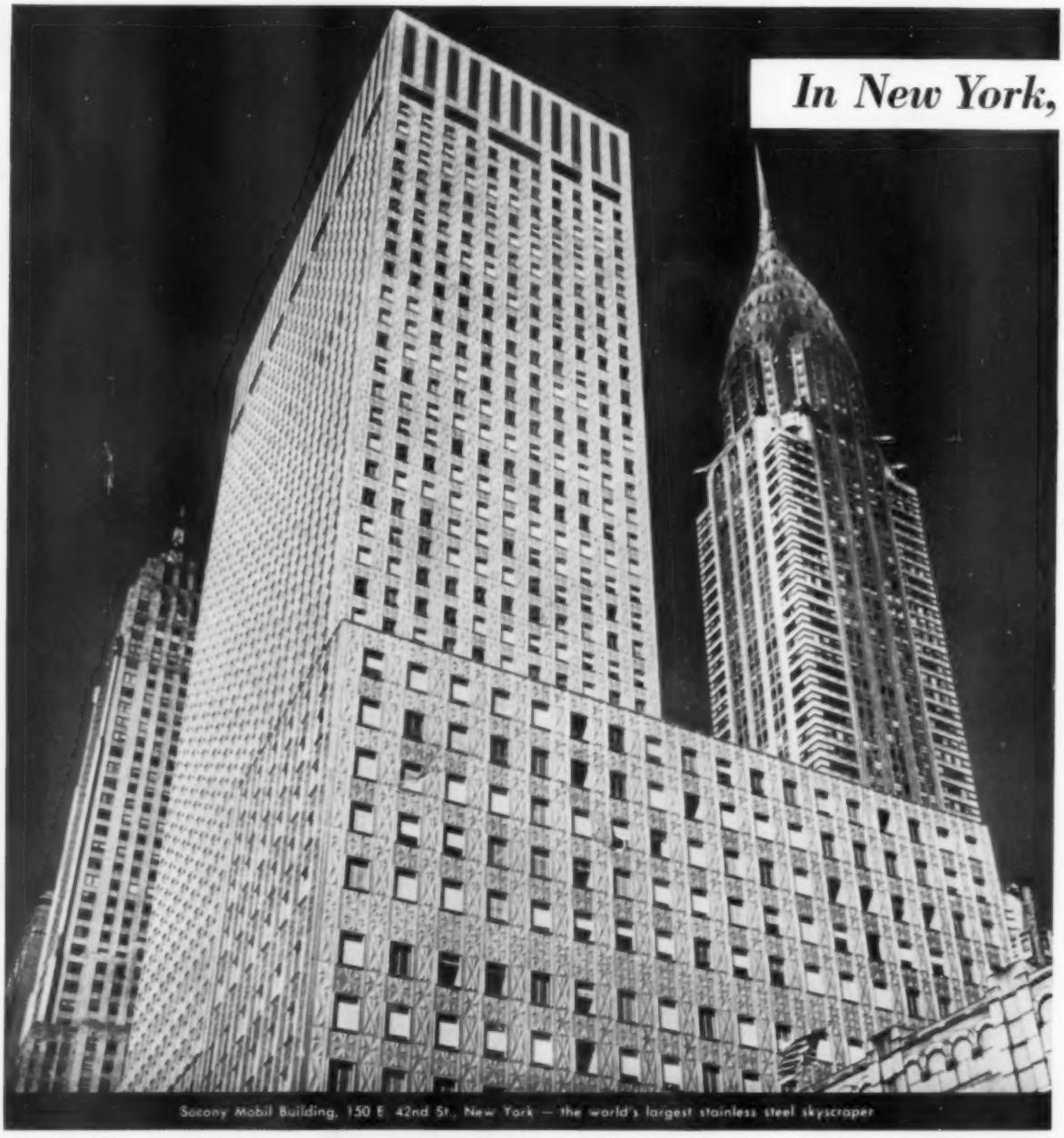

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As a result, Republic today is a major casing and tubing supplier serving leading oil centers everywhere. Whether you choose electric weld or seamless, think of Republic first. Send coupon for data.

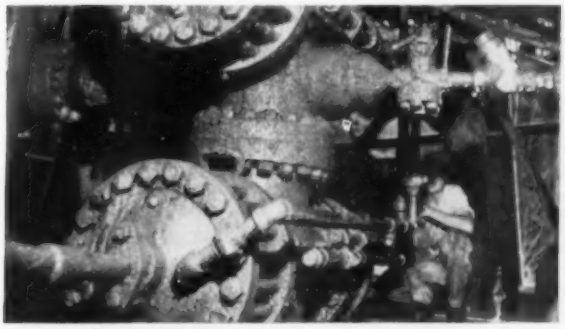
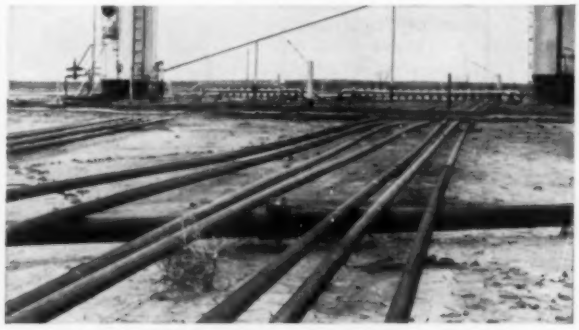


Photo courtesy of Standard Oil Co. (New Jersey)

REPUBLIC ALLOY STUDS AND HIGH CARBON HEX NUTS team up perfectly to withstand major stresses imposed on a wide variety of oil field equipment, like the blowout preventer shown here. Clean accurate threads provide high strength and wear resistance, plus ease of assembly and disassembly required for equipment maintenance. Republic has fasteners for every application. Send for information.



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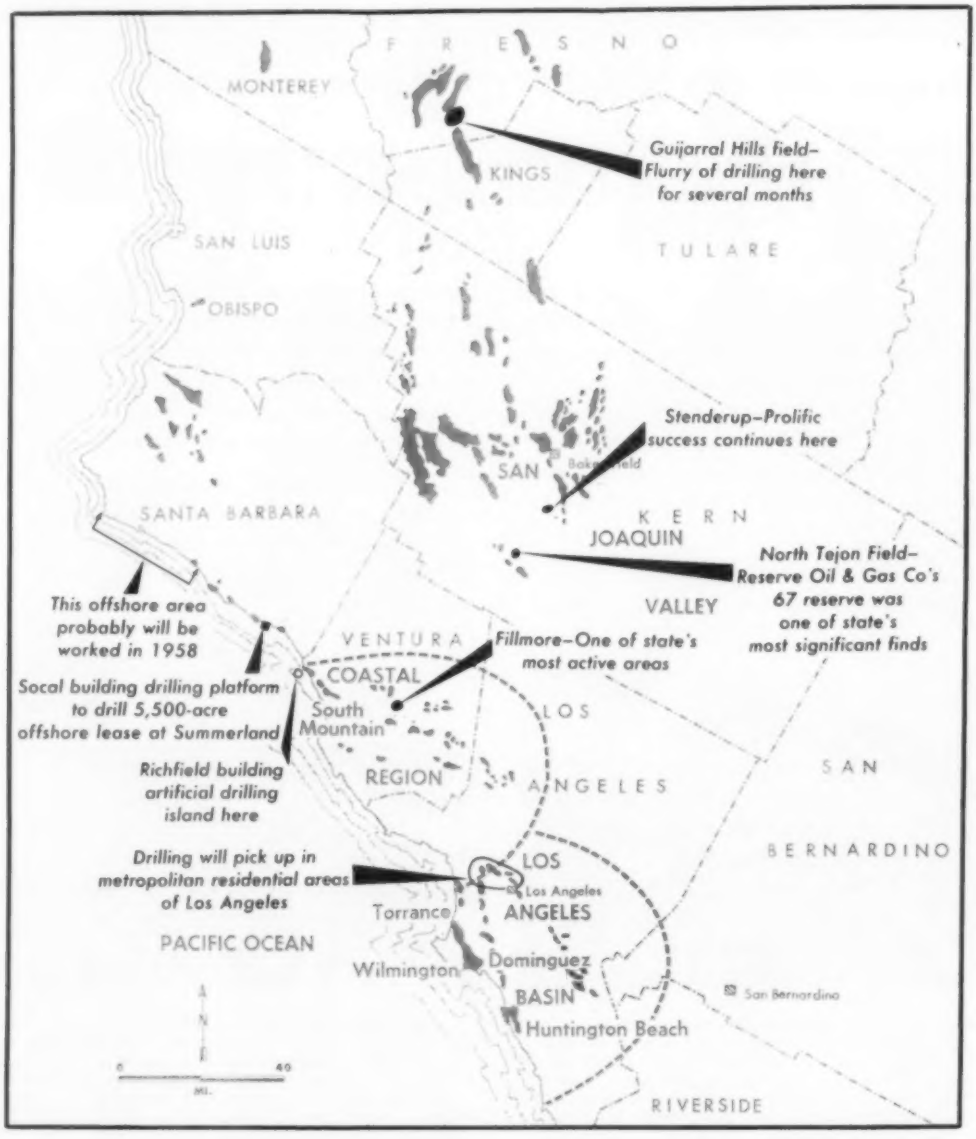


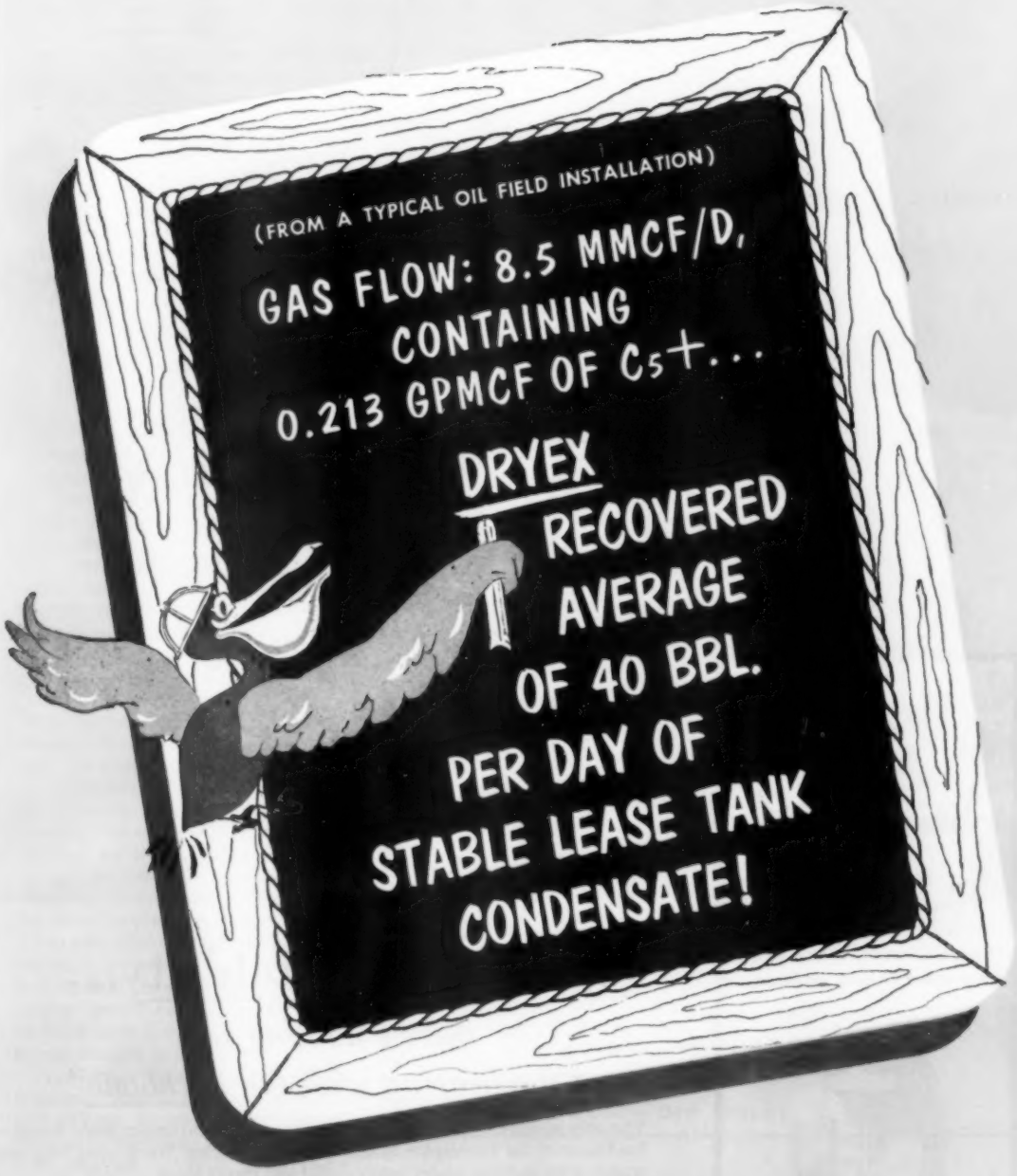
Three basins share wildcat success . . .

and we predict — • Offshore drilling will pick up • Townlot activity will increase • More Mountain View drilling • More gas in north

CALIFORNIA'S exploratory success in 1957 was centered in the San Joaquin Valley, the Ventura basin, and in the Los Angeles Basin.

. . . **Mountain View.** Union Oil Co.'s search for Stevens sand production along the west side of this Kern County field, now in its second year, resulted in three good discoveries. The particular object in this search is for stratigraphic and fault traps. Union has all the acreage in the vicinity of the discoveries sewed up, but several other majors are reportedly putting together land pictures south and southwest of Union's holdings. In 1957 Union kept two rigs busy most of the year on extension tests of Stenderup pool and Houchin pool in this play.

. . . **Guijarral Hills.** A brief flurry of drilling was touched off by L. A. Harnish in the main area of this Fresno County field. In June a new Gatchell sand discovery made more than 1,000 bbl. per day. Subsequent drilling was not too encouraging, but it had the immediate effect of keeping six or seven rigs busy for several months on extensions and offsets by other companies.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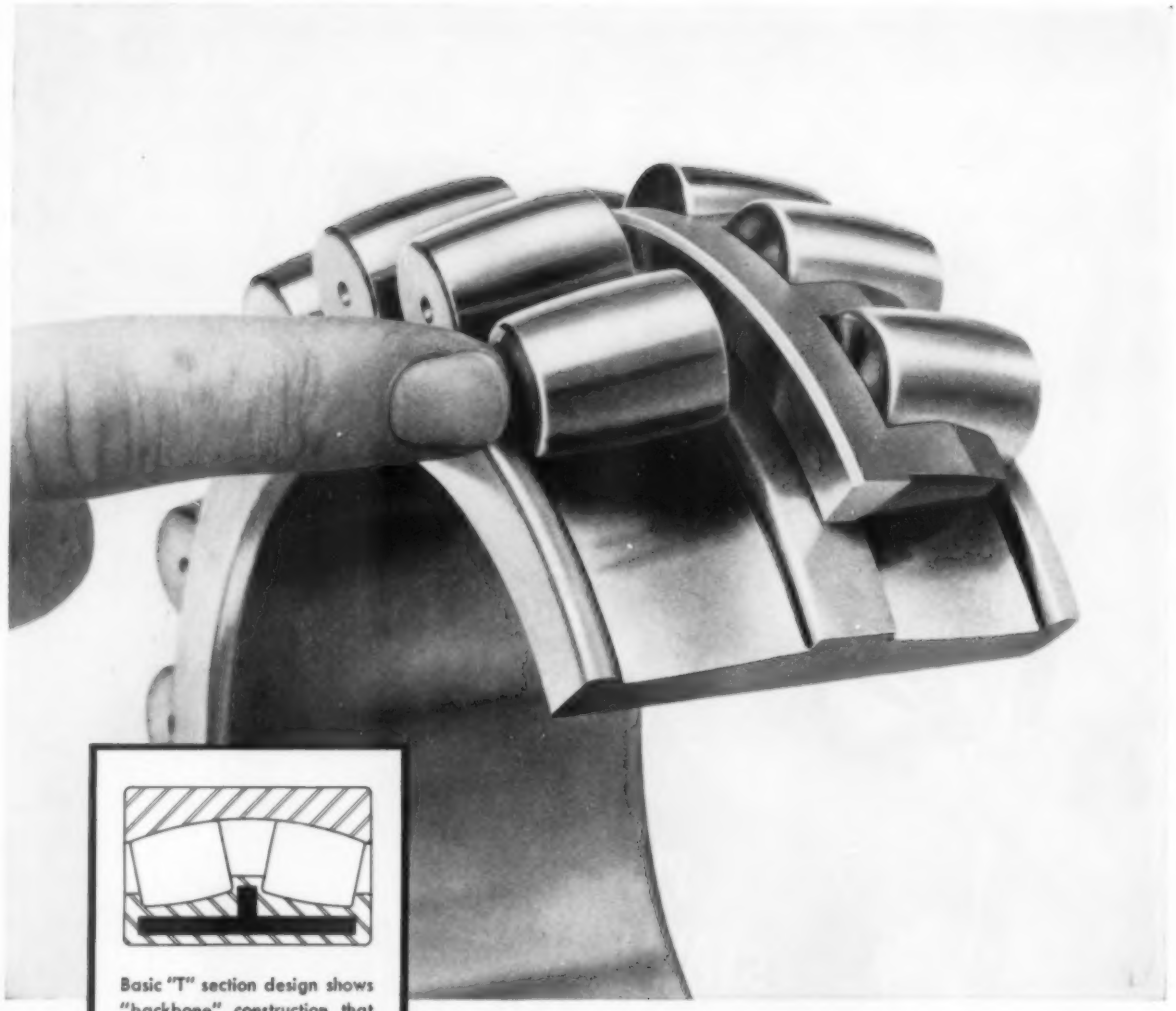

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...Fillmore field. Deep Fillmore field in Ventura County, Ventura basin, was one of the state's most active areas in 1957. At year's end there were seven rigs working on development and extension wells for Humble Oil & Refining Co., Richfield Oil Corp., Standard Oil Co. of California, and The Texas Co. The field has been fairly well defined on the west, north, and south sides, but east extensions continue to come in with excellent production. The field now measures more than 2 miles long in a southwest-northeast direction. Average well depths range down to below 14,000 ft.

...North Tejon. A recent discovery by Reserve Oil & Gas Co. at North Tejon is being hailed as one of the best strikes of the year in California. The discovery well, 67 Reserve, was completed below 11,850 ft. for about 250 bbl. per day, while the first extension test ¼ mile southeast was finaled flowing 1,300 bbl. per day.

...Other activity. Other areas which were the scene of good development drilling in 1957 in California were Honor Rancho field in Los Angeles County, and the southwest side of Oxnard field in Ventura County.

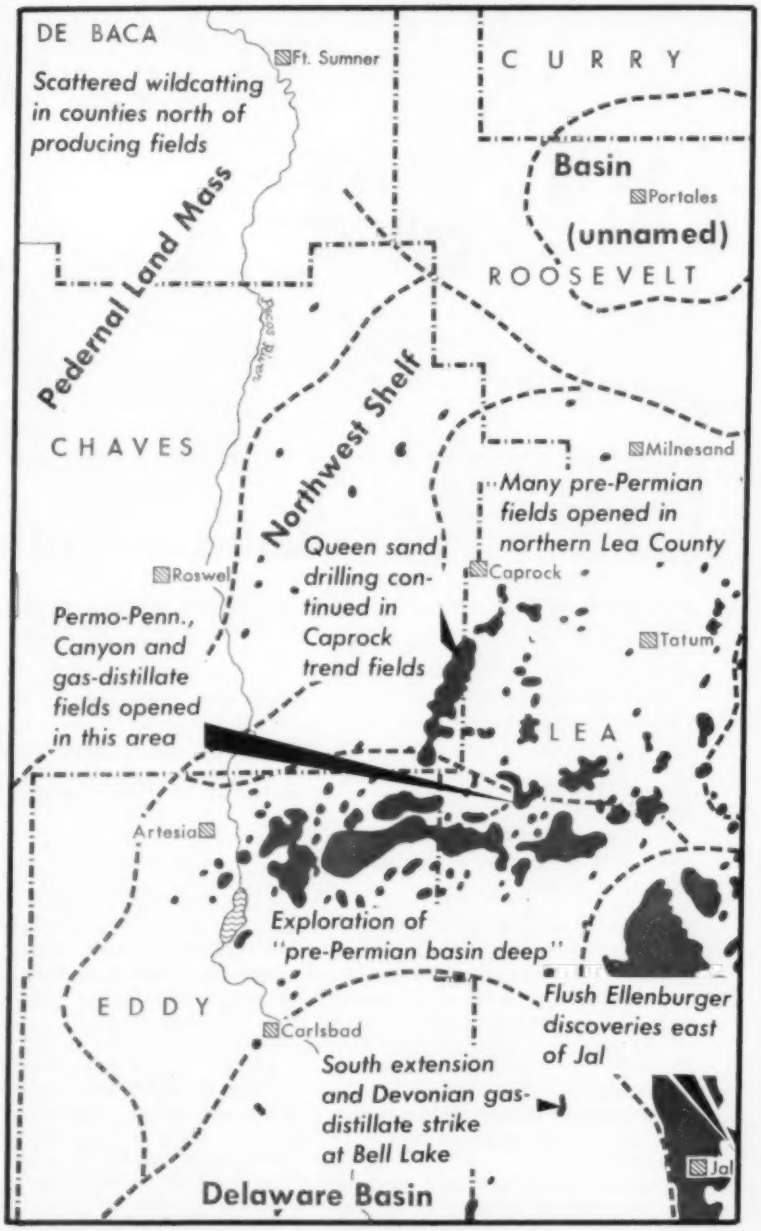
As to the future ... Several important developments appear to be on the slate for 1958 in California.

...Offshore. At least three rigs should be working on offshore drilling projects. Richfield should have a rig working on its artificial island now being built off Rincon. Standard of California should have two rigs drilling from its platform planned on the 5,500-acre offshore lease it and Humble have at Summerland, Santa Barbara County. In addition, considerable acreage should be put up for bidding in 1958 after a year's delay in 1957 due to changes in lease laws.

...Metropolitan. Drilling in the residential areas of Los Angeles should also pick up. In the past few years oil companies have been putting land pictures together in areas which were once the scene of large amounts of shallow production, but which have been undrilled in 30 years due to the growth of the city, making surface sites more valuable as homesites than as drillsites.

...Mountain View. The search for strat and fault traps along the west side of the 25-mile trending Mountain View field in Kern County will also see stepped up wildcat activity.

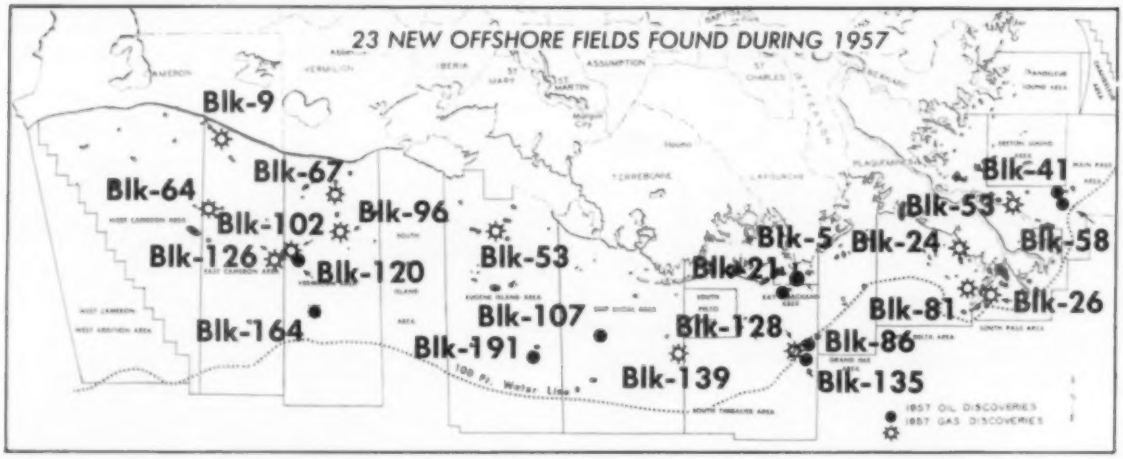
...Valley. Drilling for gas in the northern San Joaquin Valley and in the Sacramento Valley of northern California will continue at a steady pace.



New Mexico pays off . . .

and we predict — • More wildcatting in northeast • Deep drilling on rim of Delaware basin

EXPLORATION in the southeastern counties of New Mexico paid off in a number of discoveries with initial potentials in the 1,000-bbl. per day class. The early part of the year saw a heavy concentration of wildcats in the northern portion of Lea County, but by midyear, exploratory efforts had turned to the old producing areas of both Eddy and Lea counties, from Township 16 South, down to the northern rim of the Delaware basin.



Much interest is shown in the scattered drilling in the northeastern counties, such as De Baca and Curry. By year's end, this rank wildcatting had moved farther north, into San Miguel County.

Miami Petroleum Co. had two wells going northwest of Tucumcari, both scheduled to the Precambrian granite, which was expected near 7,000 ft. These tests are 1 Hoover Ranch and 1 Bell Ranch.

J. D. Hancock Exploration Co. 1 Sedberry, also in San Migual County, was reported shut down for the winter, at 5,102 ft. Several gas shows have been reported.

Pre-Permian basin deep . . . This geological term refers to the conditions at the time the various formations were building. It is an area considered high in percentage of favorability for petroleum accumulations, and, although all geologists are not in agreement, in Southeast New Mexico it includes producing fields in Lea and Eddy counties up to about the Caprock trend.

Recent drilling east and southeast of the town of Artesia opened two gas-distillate pools in the Pennsylvanian, at depths ranging from 9,000-10,000 ft. At the same time, a wildcat just outside previously defined limits of shallow production at Artesia field flowed better than 50 bbl. of oil an hour while testing in the Abo, of lower Permian age, near the 6,000-ft. level.

One of the biggest exploratory and drilling plays of the year was in Lea County, between Anderson Ranch field on the west and Townsend field on the east. The shaded area shown on the accompanying map is not yet one big producing field, but comprises a number of recent discoveries and major extensions.

Louisiana offshore has banner year, expects another . . .

and we predict — • 800 wells drilled, 25 new fields found in '58 • Drilling will go 75 to 100 miles offshore, in water up to 200 ft. deep.

LOUISIANA'S 1957 offshore exploration and development scoreboard shows 671 wells drilled, 23 new fields found, and 18 additional discoveries, consisting of new producing horizons opened and major extensions at existing fields.

In number of wells drilled, it was a banner year. Completions during the year exceeded those of the preceding year by 245. This was despite the fact that two large multiple-pay fields (South Pass Block 24 and Main Pass Block 69), which accounted for a sizable portion of 1956's drilling, passed their peaks and settled to more or less routine development.

During 1957, there were no large concentrations of drilling activity. Exploration and development were scattered over more widespread areas.

The 23 new fields found, although not the record, exceeded 1956's score by one new-field discovery. Twenty-two new fields were found in that year. The record for any one year was 27 new fields, in 1955. It was in that year that offshore drilling began to build up momentum, and with more virgin choice prospects from which to choose, explorers were able to click them off for production in fairly rapid order.

Many of the discovery wells of 1957, as in any year, proved new production in more than one horizon. Consequently, their completions represent the finding of more reservoirs and greater potential reserves than the mere numerical listing of the wells might indicate. In at least two instances, discovery wells were completed in three separate zones. Multiple-sand conditions are characteristic of all South Louisiana drilling.

New fields opened included 9 classed as productive of oil, and 14 yielding gas and condensate, or dry gas. They raised the total number of Louisiana's offshore fie'ds to 114.

Of the 671 wells drilled during the year, 463 were productive, either of oil, gas and condensate, or just gas. This represented a success ratio of 69 per cent, bettering 1956's success ratio of 67.37 per cent from 287 productive completions out of 426 wells drilled.

The success ratio of exploratory wells, including major field-extension wells and those finding new productive horizons in existing fields, was 45 per cent. This was slightly under the 51.9 per cent success ratio of exploratory wells in 1956. Ninety-one of the year's 671 wells were exploratory.

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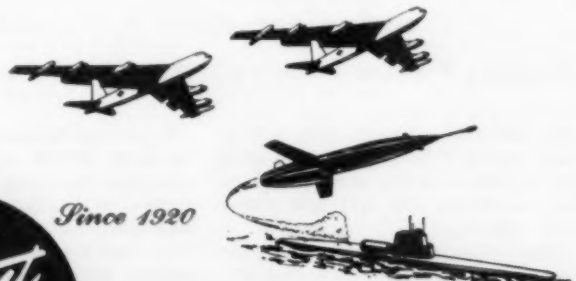

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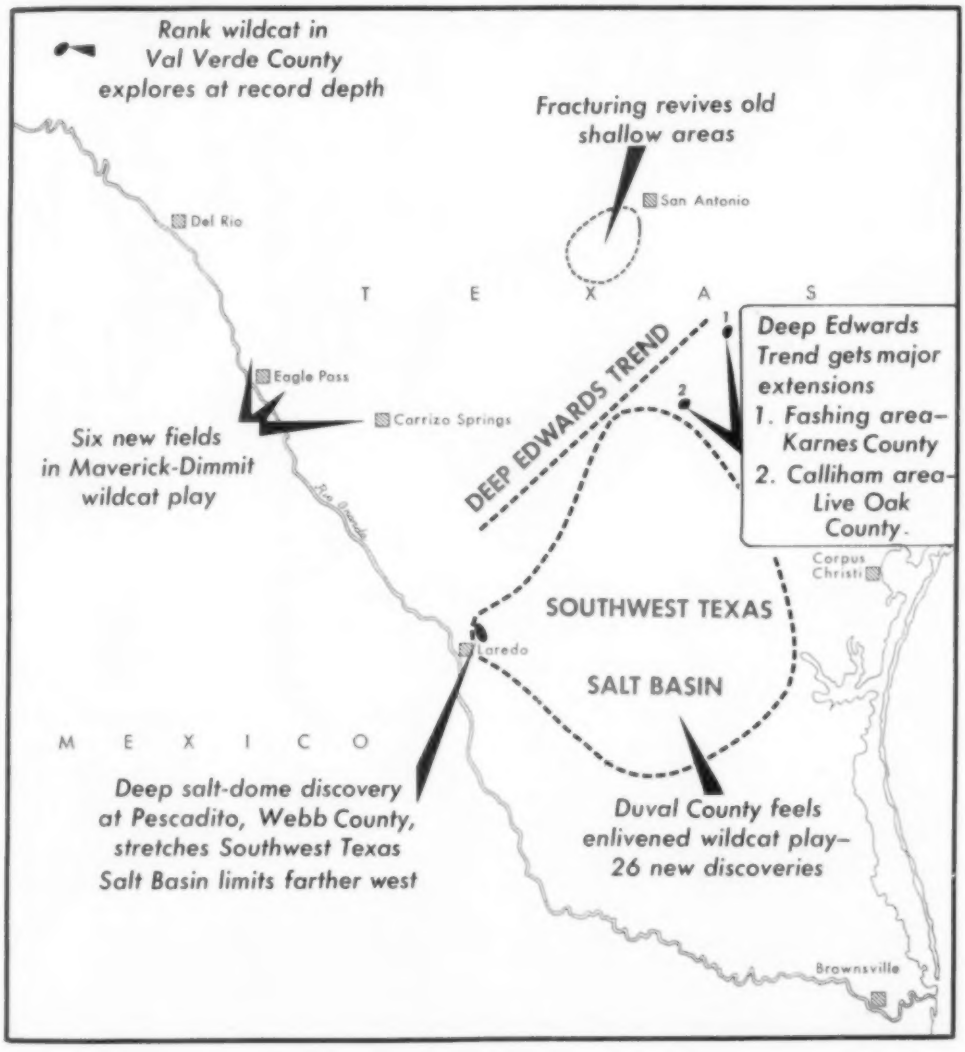

Rank wildcat in Val Verde County explores at record depth
Fracturing revives old shallow areas
San Antonio
Del Rio
T E X A S
Deep Edwards Trend gets major extensions
1. Fashing area–Karnes County
2. Calliham area–Live Oak County.
Eagle Pass
Carrizo Springs
DEEP EDWARDS TREND
Six new fields in Maverick-Dimmit wildcat play
Rio Grande
Corpus Christi
SOUTHWEST TEXAS
Laredo
SALT BASIN
M E X I C O
Deep salt-dome discovery at Pescadito, Webb County, stretches Southwest Texas Salt Basin limits farther west
Duval County feels enlivened wildcat play–26 new discoveries
Brownsville

Southwest still holds bright promise

and we predict — • First production at Pescadito • First Smackover discovery • Major discovery in far-western counties

SOUTHWEST TEXAS continued to loom during 1957 as one of the state's and Midwest's most promising regions for new exploration and new petroleum reserves.

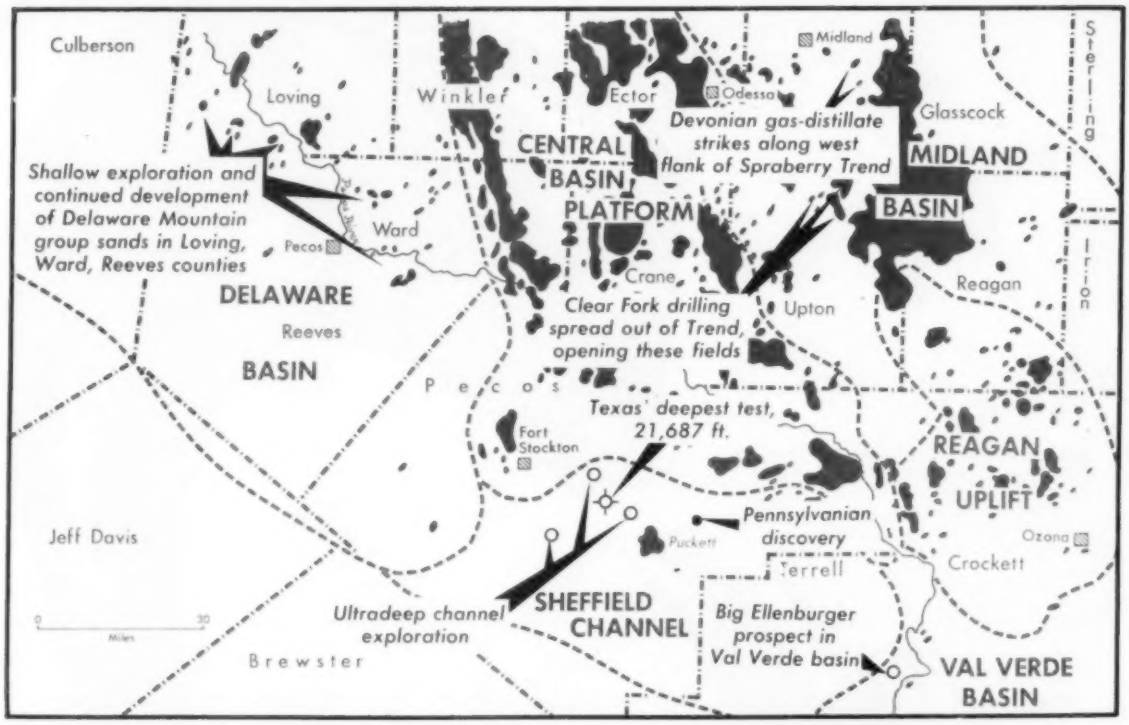
New exploration during the year also gave further evidence that the region's prospects for discovery of additional important oil and gas reserves lie not only in the vast meagerly explored areas of its far-western counties, but also in some of its older and more densely drilled producing counties.

Even such counties as Duval, in the heart of the region's producing area, and the scene of some of the earliest exploration in South Texas and successive waves of drilling activity over the years, continued happy hunting grounds for new oil and gas production.

Prospects for additional new production along the region's "Deep Edwards Trend" continued bright. This line of relatively new fields with production from coastward downdip phases of the Edwards formation at 10,000-14,000-ft. depths was extended during the year from LaSalle, McMullen, and Atascosa counties northeastward into Karnes County, and eastward and farther coastward into Live Oak County.

Deep Edwards production (gas) was found at two other places along the trend, one at Green Franklin in northeastern McMullen County, and the other at Mula Pasture, near the county's western line. These bring to 16 the number of different fields in which production already has been

WEST TEXAS



W. Texas had good '57

and we predict — More ultradeep wildcats • Successes in Sheffield channel will prompt a new look at the Delaware and Val Verde basins

WEST TEXAS oil country, comprising Texas Railroad Commission's Districts 7-C and 8, had a good year in 1957. Activity was spread over most of the areas, but long before year's end, deep exploration and hope for new provinces had swung southward toward Delaware and Val Verde basins, and Sheffield channel, which connects the two basins.

Val Verde basin hopeful . . . Magnolia Petroleum Co.'s Terrell County wildcat was the big question at year's end. Terrell County has had spurts of wildcatting but this appears to be the first major structural find.

Magnolia's well has a thick Ellenburger section. Drill-stem tests at intervals between the formation top at 13,742 ft. and first salt water around 14,996 ft. all had good gas shows. Best gas flow was at 14,220 ft., where it gaged 14,000 M.c.f. per day through ½-in. choke. Operators reported top of the Wilberns sand at 15,365 ft., and Precambrian rock at 15,445 ft. Testing was still under way at this writing.

Sheffield channel . . . Here is the area of Texas' depth record holder, at 21,687 ft., and the scene of a number of ultra deep wildcats, going to 18,000 ft. or more.

Pan American Petroleum Corp. 1-CS University stopped at 21,687 ft. due to stuck drill pipe. At that point it was in a thick section of Barnett shale of Mississippian age and short of its Ellenburger goal.

Biggest question mark and center of interest, at year end, was Phillips Petroleum Co.'s 1-EE University, one of three of the deep channel tests being drilled by Phillips and others. Operators at 1-EE reported an overthrust fault. Electric log showed Simpson sand at 13,425 ft. and the Ellenburger at 16,708 ft. When the

discovered in the deep Edwards zones. Most of them, productive of gas and condensate, have been found within the past 3 years and have received only limited development so far.

Exploration for Edwards production was extended more than 35 miles south from the present most southwesterly field (Stuart City, in southwestern LaSalle County) by a deep test drilled on the old Pescadito prospect, northeast of Laredo, in Webb County (on the Mexican border). This test did not find the Edwards but did make a significant discovery by drilling into salt. It proved the long-recognized Pescadito structure, one of Southwest Texas' largest geological features, to be a deeply seated salt dome.

Maverick, one of the region's far-western, wide-open counties, in the upper reaches of the Rio Grande embayment, felt a wave of shallow wildcatting which resulted in the discovery of six new fields.

A new exploratory depth record for Southwest Texas was set during the year in Val Verde County, another of the region's sparsely drilled far-western counties. It was in a rank wildcat drilled by Humble Oil & Refining Co. about 2 miles northwest of Pandale, in the northwestern part of the county. A depth of 17,525 ft. was reached with abandonment in the Cambro-Ordovician.

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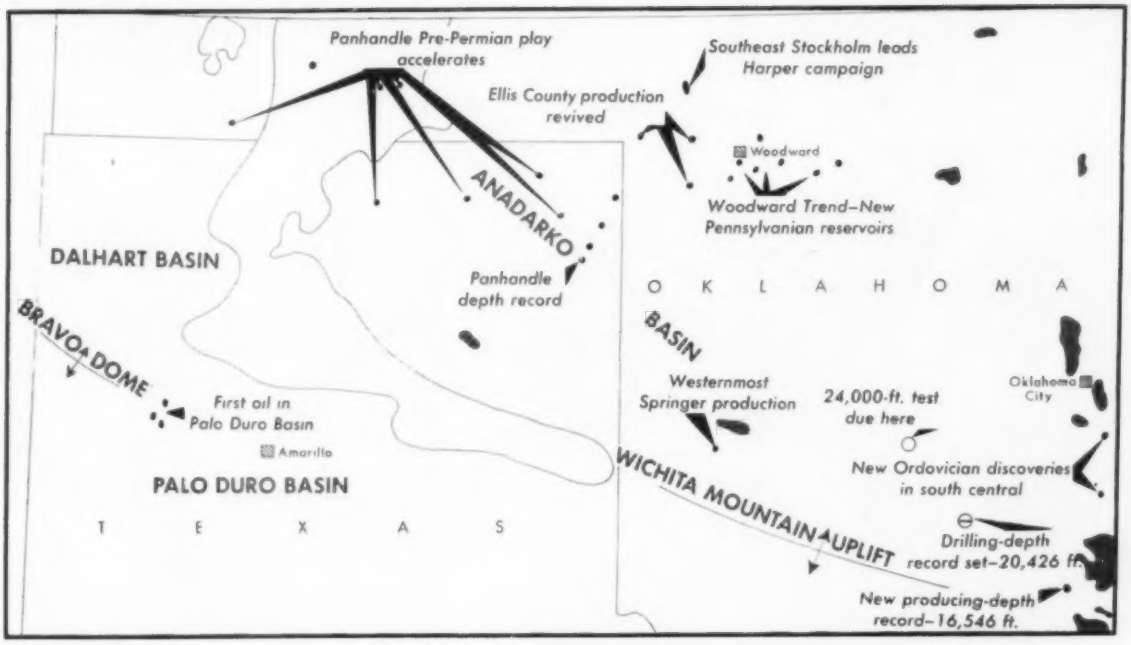
ANADARKO BASIN-PANHANDLE



bit went into a second Simpson section at 20,520 ft. it was decided to amend drilling permit to 23,000 ft. At that depth, drill progress was at the rate of 40 ft. a day, and operators were looking for the second Ellenburger section.

The channel's only pre-Permian discovery of the year was Standard Oil Co. of Texas 1 Hokit 2, northeast of Puckett field. For a time it was reported as an Ellenburger discovery, due to oil recovery on drill-stem tests, but for completion it backed up the hole to make a flowing Strawn well around 9,400 ft.

Delaware basin . . . Texas' portion of this big sedimentary basin saw little drilling in the way of deep exploration. However, Delaware sands in northwestern Reeves, in Loving, and Ward counties provided many good discoveries, plus considerable development drilling throughout the year. Operators feel that pre-Permian strikes in the Sheffield channel will offer inducement to tackle similar deep beds in the basin.

Other developments of the year included a number of Devonian and Strawn pool openers and extensions along the west flank of the Spraberry Trend fields. Clear Fork recompletions continued within trend fields, but the big flurry in Clear Fork drilling was the number of new fields opened in a 15-mile-long stretch east of Pegasus and west of the trend, in both Upton and Midland counties.

Oklahoma drills deeper, reaches deeper for oil . . .

and we predict — • More Palo Duro oil • New world's depth record • Increased Ordovician search

OKLAHOMA BOASTS three new superlatives with a new drilling-depth record, a new producing-depth record, and a new candidate for the world's deepest hole. These were the top stories in exploration in the Anadarko basin.

The opening of vast new wildcat country in northwestern Oklahoma, extensive new reserves in south-central counties, and continued growth of the pre-Permian areas in northwestern counties and the Panhandle rounded out one of the most important and successful wildcat years in this region's history.

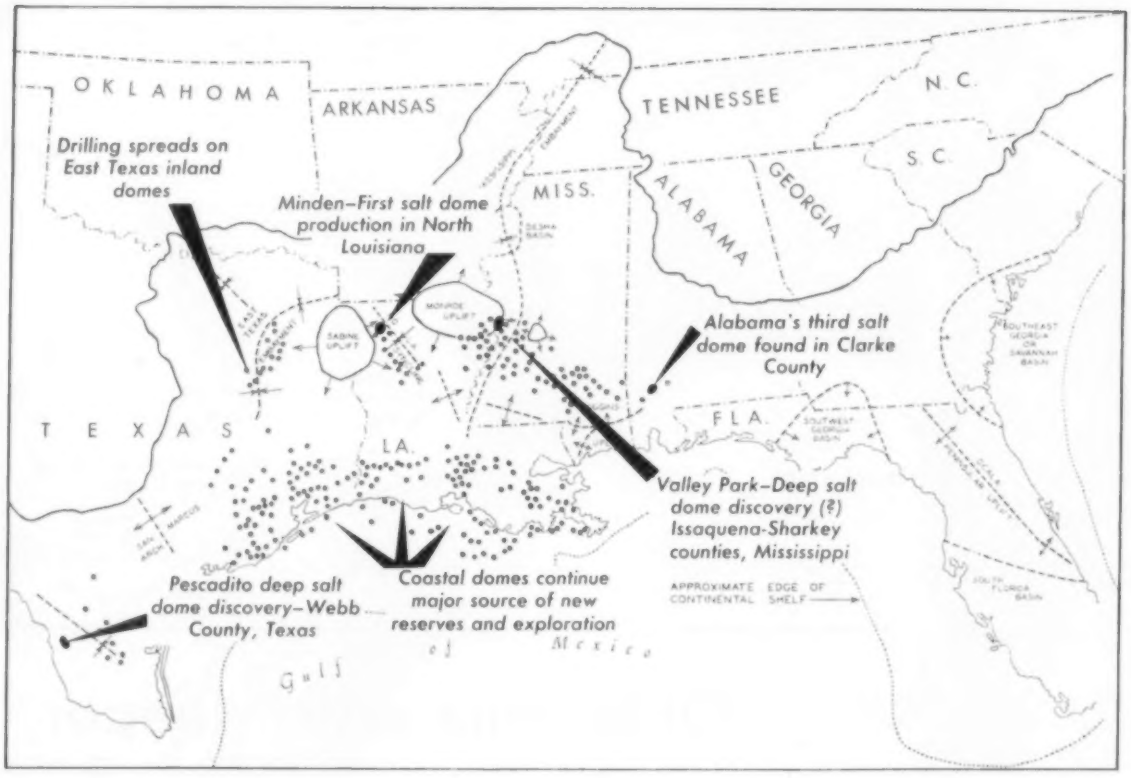
Depth records . . . Magnolia Petroleum Co. dug the deepest hole in the state at 1 Sterba-Ordovician. The well went to 20,426 ft. Location is in Cement field, Caddo County. At year's end the wildcat had been turned over to Gulf Oil Corp. for further testing after Magnolia plugged back to the Springer for unsuccessful production tests.

British-American Oil Producing Co. tapped the state's deepest production at its 1 Krieger in the ultra-deep play under way at Carter-Knox field in Grady and Stephens counties. The record-breaking well found gas-distillate production in the Oil Creek-Ordovician sands at 16,546 ft. Carter-Knox field is the scene of the deepest drilling campaign in history for Oklahoma with several wells finding production below 15,000 ft. and more planned.

A wildcat now drilling on the Fort Cobb anticline in Caddo County (Howell, Holloway & Howell 1 Anadarko Basin) is aimed for the 24,000-ft. mark and a new world's depth record. This test is being drilled on one of the Mid-Continent province's biggest nonproductive structures.

Woodward trend . . . The entire northwestern corner of Oklahoma, including the Panhandle counties, saw a new exploratory era unfold. First production was opened in Woodward and Blaine counties, Ellis County production was revived, widespread discoveries in the northern

SALT DOME BASINS



half of Harper County expanded the pre-Permian reservoirs in that section, and deep Morrow development under the Hugoton gas field in the Panhandle rose to new heights.

Six new fields were opened in once-dry Woodward County, opening a new trend of Pennsylvanian production that stretches from the Panhandle southeast to western Major County. Ellis County recorded three new discoveries that firmly tied in with the Woodward trend on the west.

South-Central . . . Extensive new oil reserves were uncovered in Cleveland and McClain counties. The Ordovician section of this part of Oklahoma has fast come into its own as the prime target for the wildcat drill.

Texas Panhandle

This vast portion of the Anadarko basin had its best year yet in the number of new fields opened. The pre-Permian push continued unabated in Ochiltree, Hansford, Hemphill, and Lipscomb counties.

A new drilling-depth record was set in the Panhandle at Magnolia 1 Feldman in Hemphill County. The wildcat went to 16,000 ft. in the Ellenburger before plugging back for Morrow-Pennsylvanian production tests and completion.

Salt domes make headlines in 1957 . . .

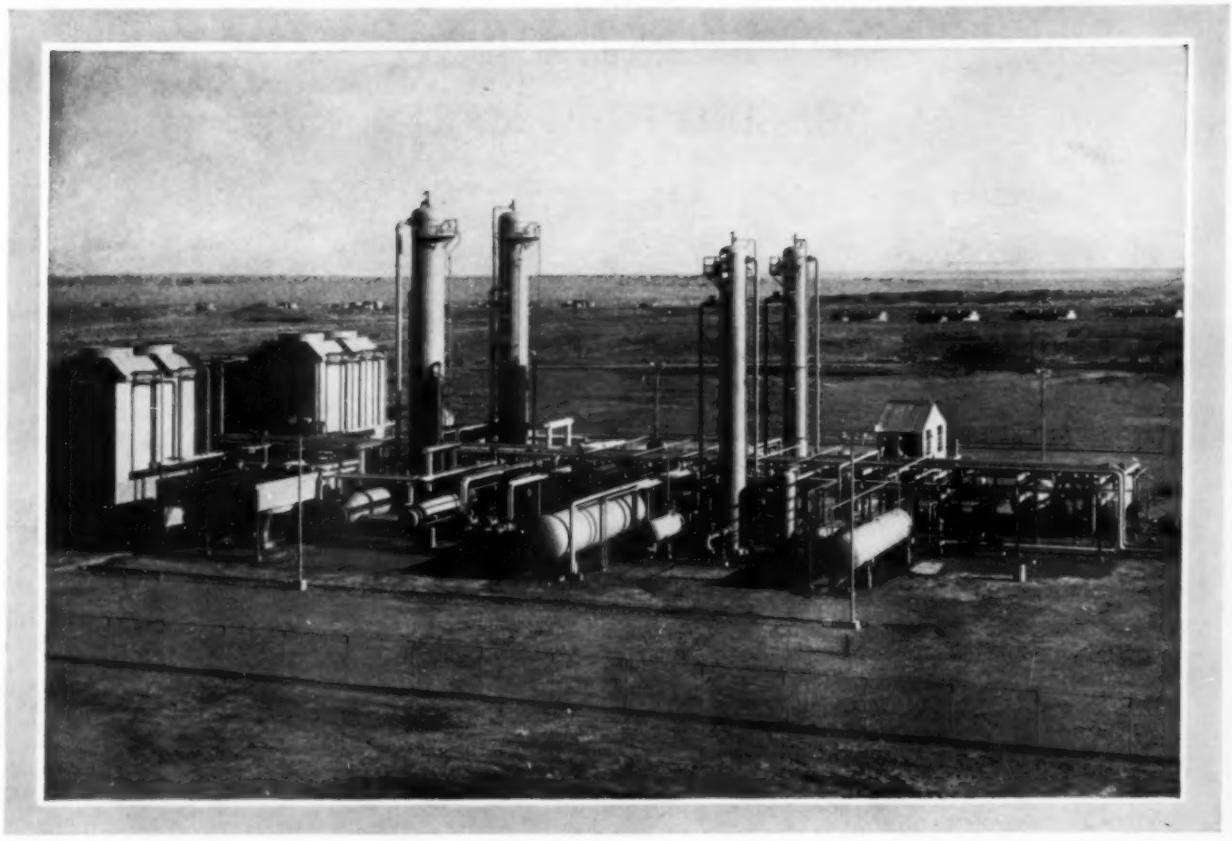
and we predict — • Three more producing interior domes • Another salt-dome field for Alabama • Major Texas offshore salt-dome discovery

SIGNIFICANT developments in the country's salt-dome areas during 1957 were highlighted by the discovery of production on North Louisiana's Minden dome, proving of the large Pescadito geological feature in Southwest Texas' Webb County to be a deeply seated salt mass, and the finding of another deeply seated salt dome in southern Alabama, at the other extremity of the coastal salt-dome region.

The discovery at Minden was the first commercial production on any of the 17 known domes of the inland North Louisiana salt basin. The discovery well, drilled by Pan American Petroleum Corp. on the east flank of the dome, was completed as a gas-condensate producer in Lower Cretaceous-Paluxy sand at 7,460-66 ft. after drilling to 11,604 ft., in salt topped at 11,590 ft.

This is a piercement-type dome, as also are the remaining unproductive domes in the basin. Salt on top of the dome has been found as high as 1,583 ft. The dome is at the northern end of the basin, in Webster Parish.

Proving Pescadito to be a salt dome not only helps to unravel one of Southwest Texas' biggest puzzles, but also extends the indicated limits of the large Southwest Texas salt basin another 50 miles westward. The salt-discovery well, drilled by Ginther, Warren & Ginther, of Houston, was started with the Edwards as its ob-

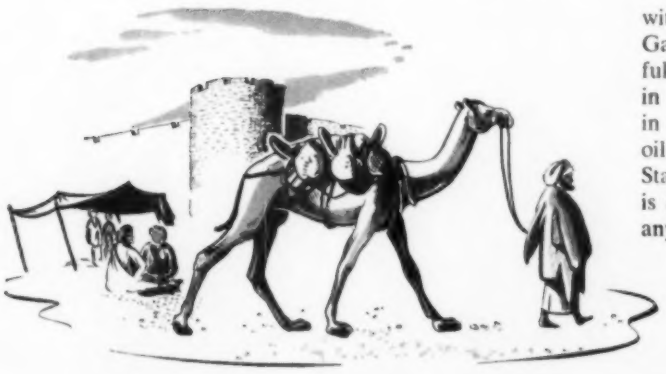


Sui GAS STARTS TO KARACHI

This plant, the first of its kind in Asia, is located in the Sui Gas Field 350 miles northeast of Karachi in West Pakistan. It processes sour gas, removing sulphur compounds and water vapor, preparing the gas for transportation and consumption. It is a vital part of a project from which will accrue great economic advantage to Pakistan.

The work of Hudson included design, procurement of equipment, transportation, and erection using English, American and native labor.

Despite the remoteness of the plant site, the rail terminus being 40 miles across the desert, and air temperatures as high as 125°F. in the shade, the plant was completed in 12 months from start of design work.



Hudson is proud to have collaborated with Pakistan Petroleum, Limited, and Sui Gas Transmission Corporation in the successful completion of this first project of its kind in Asia. The experience of Hudson gained in over 30 years in design and construction of oil and gas processing plants in the United States, Europe, Mexico and South America is available for any project large or small in any part of the world.

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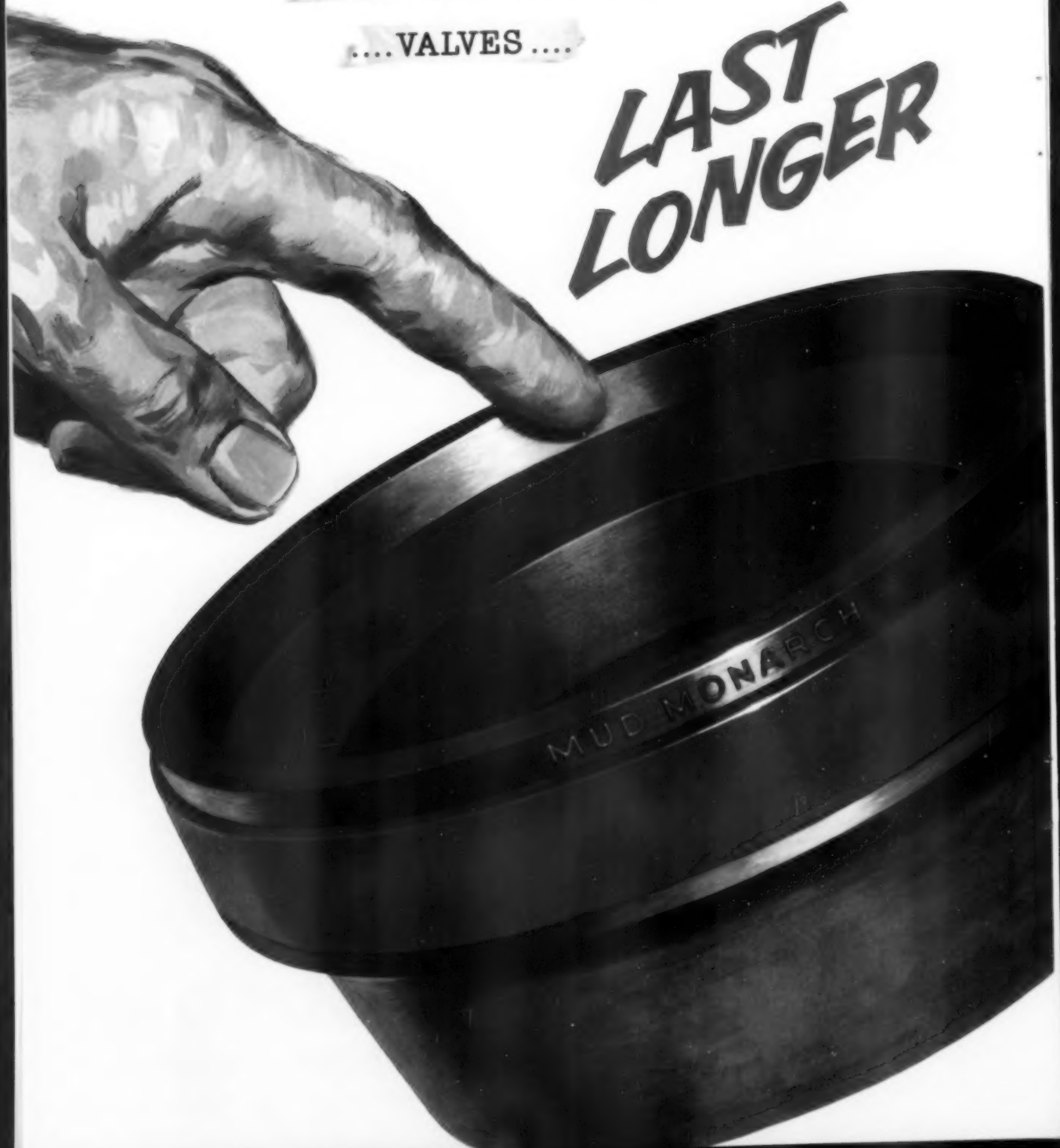
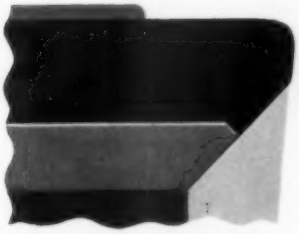
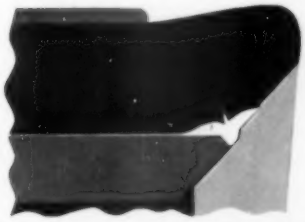
LAST LONGER



CONVENTIONAL



Conventional valves use a sealing element that seals at an angle, usually in the same plane with at least part of the striking surface. This arrangement works well when the valve is new and when pump pressures are low.



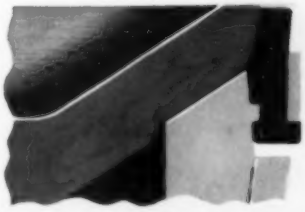
With wear, however, an opening forms at the junction of valve body, seat and sealing element. High pump pressures force part of the rubber sealing element into this space and it is pinched off. The result is short life for both sealing element and valve.

MISSION MUD MONARCH

NEW

With Mud Monarch Valves, the valve body strikes against the entire inclined surface of the valve seat, and the near-vertical seal ring seals against the outside diameter of the valve body. With this design, seal ring life is independent of valve and seat wear.

WORN



With wear, the entire inclined striking surface of the seat is worn away. An opening can't form next to the seal ring. Both valve and seat wear longer before they need be replaced and seal ring life is increased substantially—

HERE'S WHY MUD MONARCH VALVES LAST LONGER THAN CONVENTIONAL VALVES UNDER JET DRILLING CONDITIONS

Most slush pump valves do a good job when they are new, but when valve body and seat become worn, an opening forms between seat and body next to the sealing element that plays havoc with valve life. This condition exists, to a certain degree, with all valves except the Mud Monarch. By preventing the formation of this opening, Mission Engineers have developed a valve that gives truly outstanding service – especially in high pressure jet drilling where most valves fail rapidly. If you are dissatisfied with the service you are getting from slush pump valves, try the Mission Mud Monarch. You will discover a new high in valve performance and a new low in valve costs. Like all Mission Products, Mud Monarch valves are guaranteed to give outstanding service or your money is refunded. You can't lose, so try them right away. They are made in sizes to fit most pumps and are available through all supply stores.

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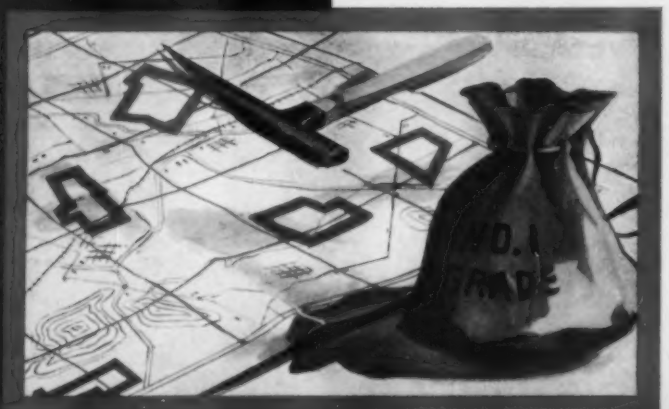

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jective, but after penetrating Georgetown, it went into salt at 15,079 ft. Hole was drilled to 15,109 ft. where, after testing promising gas showings in several zones, it was abandoned.

The new salt dome in Alabama is the third for that state. Located southwest of Alma, in southern Clarke County, it is at the eastern extremity of the Mississippi salt basin. There, it is the most easterly of all the country's known domes. It is about 15 miles north and a little east of South Carlton field, which overlies one of the state's other known domes, and about 20 miles northwest of McIntosh dome, in southern Washington County.

Its discovery well, drilled by Humble Oil & Refining Co., got first salt just below 9,200 ft., and solid salt below 10,500 ft. Hole was abandoned at total depth of 15,350 ft.

The Mississippi basin had another indicated salt-dome discovery, located at Valley Park, on the Issaquena-Sharkey county line, at Mississippi's western edge. Whether the salt drilled was of bed type or in a domal salt mass was not determined. It was found in Amerada Petroleum Corp.'s second well for its new Valley Park Lower Cretaceous field. Salt was topped at 12,421 ft., below anhydrite (possibly cap rock), and drilled to total depth of 12,665 ft. The well finally was completed as a small pumping oil producer in a 6,200-ft. Rodessa sand. A previous well, completed late in 1956, had discovered the field with small oil production from Lower Cretaceous-Mooringsport sand.

Washington—No. 32 . . .

and we predict — • Brisk wildcat campaign in the Pacific Northwest • Campaign will extend into Vancouver area of British Columbia

WASHINGTON officially became the thirty-second oil-producing state in the nation in 1957 after many years of wildcatting, shows of oil, and disappointments. The discovery well for the state is Sunshine Mining Co. et al 1 Medina in the Ocean City area of Grays Harbor County on the Pacific Ocean beach.

The 1 Medina flowed 223 bbl. of oil per day on production tests from the Nye-lower Miocene at 3,940-63 ft. The well has been offset but has not yet been officially confirmed. A confirmation discovery will really shake the dust off the Pacific Northwest. The Medina well is now on production.

The search for oil in Washington has been going on for many years. Hundreds of wells were drilled throughout the state, and many of them had reported oil and gas, but always in noncommercial quantities. The state has many possible oil basins . . . the Quincy, Pasco, Yakima, and Bellingham, but the Ocean City area along the coast appears to be the best potentially productive area in the state.

The Medina well is the eighth wildcat to probe the large Ocean City anticline. The structure is 3½ miles long, and is cut by at least two faults, both upthrown to the west, which merge scissor-fashion at the south end of the uplift.

At first the news of oil discovery in Washington last summer failed to get too many people excited due to the long history of near discovery in the state. By August 1, however, the state was caught up in the wildest rush for leases in its history. With the Medina well on official production, new exploratory interest in the Pacific Northwest is on the definite rebound. The next couple of years may see Oregon and Idaho join the list of producing states. The Medina well shows there is oil in the region, but as in all new provinces, it takes drilling to uncover more.

Southwest British Columbia . . . Canadians are looking at the possibilities of finding production in this region. Interest is picking up in exploratory drilling on Vancouver Island, and across the bay to the east onshore. Indications are that work will begin soon in these two areas.

Gas discoveries spark news north of border . . .

and we predict — • Foothills gas belt will reach B.C. border • More Slave Point discoveries • More new oil fields in British Columbia

TOP WILDCAT news stories in western Canada in 1957 were the Slave Point-Devonian discoveries in the Virginia Hills region, four huge gas discoveries in the southwestern mountain foothills area of Alberta, the northwestward push of gas production in the foothills belt, new oil discoveries in British Columbia, and the fast development of Innisfail reef field 60 miles north of Calgary.

Virginia Hills . . . Five prolific wild-

Used by more drillers on more mud pumps than any other V-belt made

World leadership is the result of these 4 engineering developments

1. Tougher, more resilient cords are able to absorb the severe pulsations of mud pumps; easily handle peak loads.

2. True-fitting concave sidewalls (U. S. Pat. No. 1813698). As a Gates Belt bends around a sheave, the concave sides fill out . . . become straight . . . fit sheave grooves evenly. (Fig A.) This uniform groove contact insures greater pulling power, less wear, longer life.

Straight sided belts bulge at the sides when bent. Uneven contact (Fig. B) causes uneven wear; shortens belt life.

3. Stabilizing ribbed tops (U. S. Pat. No. 2548135) are exclusive with Gates. They dampen vibration, protect top of belt from damage, keep belt running smoothly over idler-equipped mud pump drives with no side whip.

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The four engineering developments shown at left make Rib-Top an outstanding performer in mud pumping operations.

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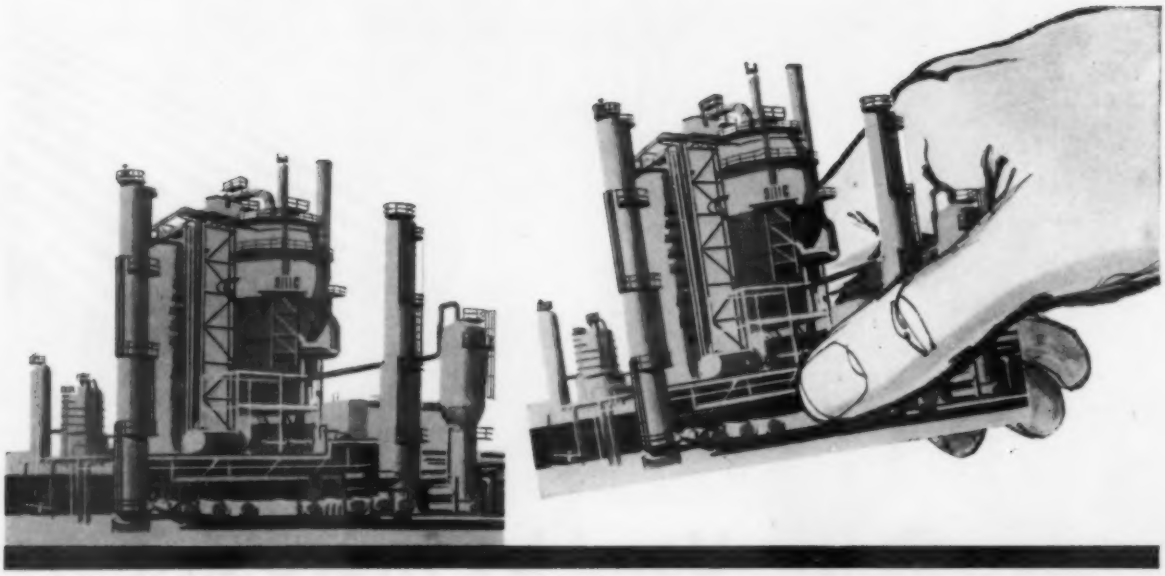
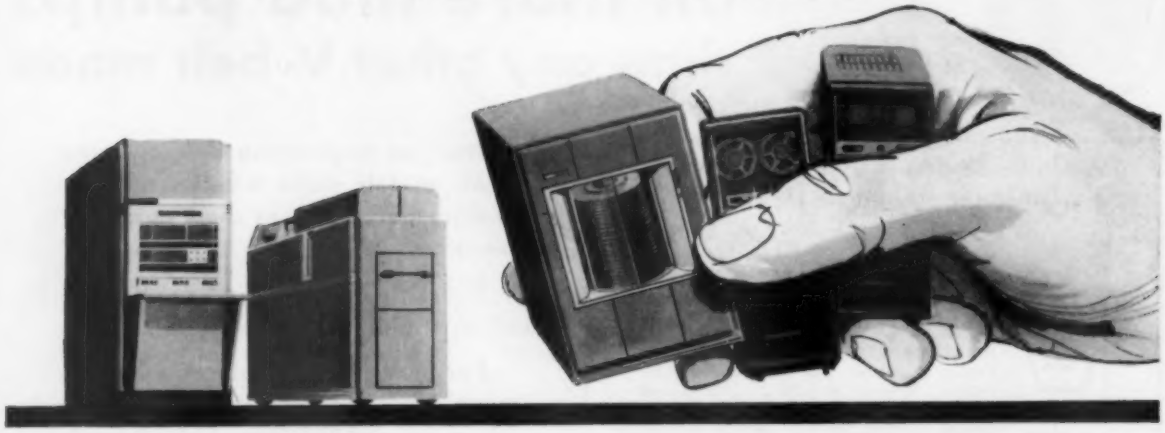


TO KEEP PACE WITH YOUR GROWTH



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cat strikes put this northwestern Alberta region in the news. Last winter Home Oil Co., Ltd., et. al. hit at 9-20 Virginia Hills, getting 1,200 bbl. of oil per day from Slave Point-Middle Devonian. This was the first well to ever find commercial oil in the Slave Point. The Virginia Hills success was closely followed by Swan Hills, Edith Lake, and then farther to the west, Kaybob and Iosegun.

A brisk campaign of follow-up wells is now in progress, promising more important developments in 1958 in this brand-new province.

Waterton Park area . . . A giant gas field is developing in the Waterton Park-Castle River area in southwestern Alberta's foothills . . . one that may even dwarf Pincher Creek. Production here is from the Rundle-Mississippian at the 11,000 to 12,000-ft. mark. Two new additions to the area are Gladstone Creek and a further extension of Waterton Park. All indications are that a field 14-15 miles long may be emerging in the foothills region.

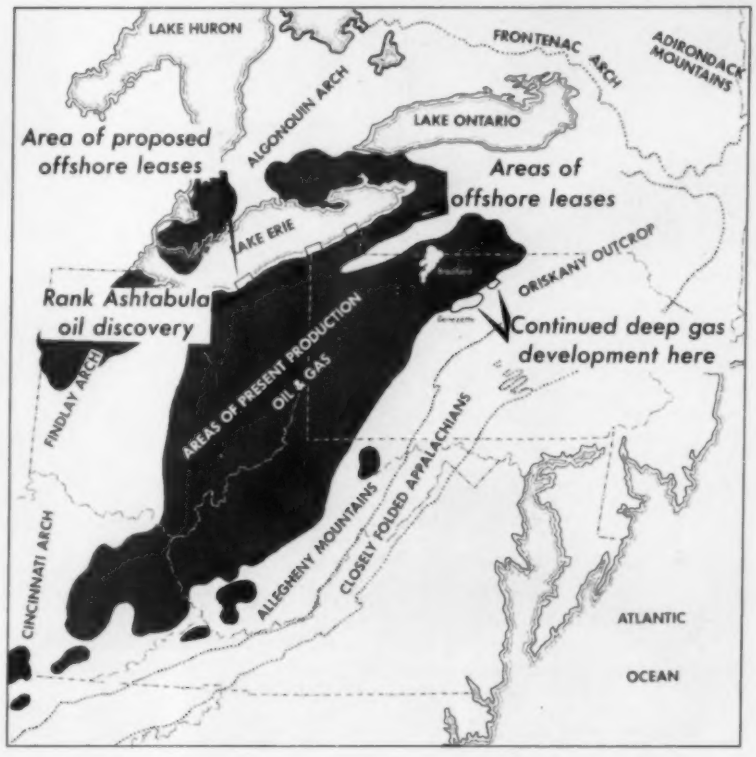
The foothills belt gas play gained further importance with the one-two-three strikes at Stolberg, Lovett River, and Lambert Creek. All produce gas from the Mississippian except Lambert Creek which found Devonian D1 production. The gas play is expected to continue its northwestward push, reaching the British Columbia border. The Lambert Creek well became Canada's deepest hole late in the year near 15,000 ft.

Innisfail . . . This new Devonian reef field north of Calgary is the fastest growing new oil field in Alberta. Opened last summer, the field now has more than 15 producers and about as many drilling or nearing completion. It is the southernmost important reef field in Alberta.

And Now?

Despite a drop in well completions, production, and exploration in 1957, the year's events were of utmost importance to the province's future drilling. Two new distinct oil and gas provinces were opened in Alberta, the Virginia Hills Devonian belt, and the Mississippian gas belt along the Alberta foothills. These two campaigns will figure heavily in 1958 development and exploration.

Seven new oil fields were opened in British Columbia in 1957, continuing a campaign that began 2 years ago. This play will increase in 1958. The important discoveries in western Canada in 1957 have paved the way for brighter exploratory days in 1958.



Oil's cradle really rocks

and we predict — • Lake Erie drilling • Stepped-up search for Silurian production in Ohio

THE APPALACHIAN basin of the northeastern United States produced real exploratory news in 1957 with promise of greater things to come in 1958. The discovery of the year was Benedum-Trees Oil Co. 1 Scribner, a lower Silurian oil discovery in northeastern Ohio's Ashtabula County. Deep gas exploration in North-Central Pennsylvania, in New York, and West Virginia continued at a fast clip. Offshore leasing in Lake Erie lights the way for wildcatting off the shores of Ohio, New York, and Pennsylvania.

The 1 Scribner discovery flowed 151 bbl. of oil per day on ⅞-in. choke. The well's success was the result of long and patient study of the geologic history of the northwestern Appalachian shelf. The strike is believed to be producing from a Medina-lower Silurian reef. These reefs are thought to be abundant on the northwestern shelf of the basin. Closest Silurian oil to the Ashtabula County discovery is 86 miles southwest at Medina. Closest oil production of any sort is nearly 40 miles to the east in the old Pennsylvania producing area.

The Ohio discovery reawakened interest in this old province. Although the number of wildcats in Ohio, for example, has declined since 1954, the success percentage has steadily risen to 41 per cent. This is one of the highest success ratios in the nation.

The Scribner discovery accents the great hidden potential of the Appalachian basin. The well density to or through the Silurian in northeastern Ohio and northwestern Pennsylvania in only one well to 36 sq. miles. Here lies an area of attractive hopes for deep production. Other areas in the province that need looking at are: the east half of Lake Erie, the subsidiary folds radiating from the Cincinnati-Algonquin arch, the deeply buried strat traps that must exist in the oldest Paleozoics as they wedge out on the east flank of the Cincinnati arch, and the thrust fault prospects in southeastern part of basin.

THIS 1957 DEEP TEST of Pan American Petroleum Corp. and others, which went to 21,687 ft. in Pecos County, Texas, symbolizes that

Drillers are ready to sink tools to 25,000 ft.

WHAT LIKELY will be the big drilling news of 1958—wells below 20,000 ft.—really is a continuation of a chain reaction touched off back in 1956. That year Richardson & Bass found oil below 21,000 ft. in a Louisiana wildcat.

That oil surprised a lot of people. They hadn't believed that there could be commercial oil so deep. While that record-setting well will likely never pay out, it did show that other wells as deep might. And, it showed that today's rotary-drilling methods are good enough to drill to 22,570 ft. and beyond.

The year 1957 brought a rash of deep, deep wells. A West Texas hole of Pan American Petroleum Corp. got to 21,687 ft. Nearby, Phillips Petroleum Co. spudded a well last summer that it plans to take to 22,000 ft. A southern Oklahoma well now drilling for Howell, Holloway & Howell of Dallas, is planned to 24,000 ft. Other operators have been thinking about holes as deep as 25,000 ft.

Of course, thinking about such deep wells is one thing and drilling them quite another. There are still some trouble spots such as mud, cement, and pipe but there don't seem to be any blank walls through which we cannot pass.

The rigs can do it . . . As far as mechanical equipment is concerned, the drilling industry is in good shape to drill 25,000 ft. Probably 20 or more rigs in the country are capable of handling drill pipe and casing to such a depth. Because diameter of drill pipe and casing must be cut down at great depths, their weight per foot is less than for shallower drilling. As a result, hook loads approach their maximum at about 18,000 ft.

Not all the rigs which can handle hook loads for 25,000 ft. have pumps for that depth. In the upper portion of such a hole, the pumps must have horsepower for circulating big volumes of mud at low pressures. In the lower hole, the pumps must be able to put up extremely high pressures—perhaps 4,000 psi.—to circulate small volumes.

Casing and drill pipe . . . Casing with minimum yield points of 140,000 and 150,000 psi. has already been used in deep wells. A 25,000-ft. well will call for pipe even stronger than this P140 and P150; P170 and P180 could well be used. Even with such high strengths, safety factors for collapse and burst of the deep strings may be considerably less than 1. And, special completions will be necessary to take care of extremely high pressures that could be found at the depths.

Grade E drill pipe is not strong enough to be used much beyond 15,000 ft. High-strength alloy drill pipe is already available, most with minimum yield strength of 110,000 psi. and above. Even stronger pipe will likely be necessary because of the high tensile loads when drilling below 20,000 ft. Drill pipe must be as large as possible in diameter to keep down the mud-circulating pressures. And, of course, the larger the diameter, the heavier the string.

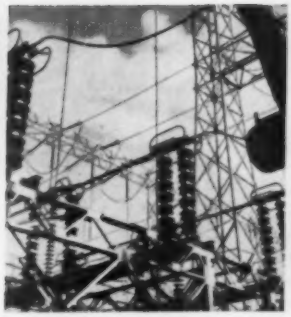
The deep-intermediate and oil strings of casing in a 25,000-ft. well would weigh too much for most companies to consider running them in a single unbroken length. Moreover, it would take a lot of precious time to lay down the drill pipe and pick casing for such a long string. For these reasons, deeper casing for such wells will mostly be run in two sections as it is now on some deep, high-pressure Gulf Coast wells.

The lower section of pipe is run on the drill pipe as a liner. This saves time since the drill pipe does not have to be laid down and since only a part of the casing is picked up. Later, the upper section of casing can be run to complete the liner to surface.

Mud and cement . . . In drilling to 25,000 ft., the depth itself is not the biggest problem; temperature is the thing that causes most headaches. High temperatures cause a jump in mud viscosity. As a result, standpipe pressures can go "out of sight." It becomes difficult or impossible to run tools into the hole; some muds even solidify. High temperature also cuts the time that a cement slurry can be pumped. This is bad since the deeper a well is, the longer pumping time is needed.

The temperature to be found at the bottom of a 25,000-ft. well could be as little as 200° F. or as much as

STEEL, with its giant equipment, uses Cities Service lubricants in mounting quantities. The list of Cities Service customers reads like a "Who's Who" of steel.



ELECTRIC POWER companies use Cities Service Diesel Lubricating Oil to set low-cost power generating records. Proof again of the high quality of Cities Service Oils.

MACHINE SHOPS find Cities Service Cutting Oils the answer to longer tool life and greater precision. Cities Service makes cutting oils for every job requirement.

PAPER requires huge quantities of highly refined wax. The best is Cities Service Pacemaker . . . used for milk cartons, wax paper, straws and many other products.

MINING is both a quantity and quality user of lubricants. Cities Service tailors precision lubricants to serve this basic industry, symbolized by the famous Mesabi Iron Range.

FARMING is more and more a mechanized industry, and more and more an important Cities Service customer. Farming uses more petroleum than any other industry.

ROAD BUILDING calls for enormous quantities of Cities Service petroleum products—all the way from fuels to lubricants to asphalt topping. Future demand looms larger and larger, as America launches the greatest highway building program in history.

Geared to the needs of fast rolling American Industry

AVIATION, with its mounting requirements of higher octane gasolene and jet fuels, finds Cities Service a major supplier. With its ultramodern refinery facilities, Cities Service is capable of producing aviation fuel components in huge quantities.

CITIES SERVICE

650° F., or more, depending on the area. Southwest Texas wells are hotter than South Louisiana wells which are, in turn, hotter than West Texas wells. In hotter areas, bottom-hole temperatures would be too high to permit drilling now to 25,000 ft. In less-hot areas, presently known muds and cements should serve nicely.

Highest temperature yet measured in a hole is the 460° F. found at 14,552 ft. in a 1957 Southwest Texas wildcat drilled for Ginther, Warren & Ginther, of Houston. Richardson & Bass' record-depth well showed just over 350° F. Both these wells used the surfactant mud developed by Magnolia Petroleum Co. Magnolia also used this mud in a Southwest Texas well which logged 386° F. Other temperature-resistant muds have also been successfully tested.

Several retarders have been used to lengthen pumping time of cement slurries at extreme temperatures, some with fair success. Thus far, in the hot wells, retarders have had to be tailored to each individual cement job.

Are new tools coming? . . . Although present tools and methods are equal to any job we foresee in the near future, the drilling industry now has more development work under way than ever before. Only part of this work is aimed directly at easing drilling at great depths. Most of the work is meant simply to make faster, cheaper hole at any depth.

Several promising new tools and ideas from this developmental work were announced in the past year. One was the "hammer drill" developed by Gulf Research & Development Co. There has always been a need for a good way to impart percussive action to a rotary bit, but until now every tool built for this purpose has failed. Gulf's new drill has more promise of succces than any like tool yet developed. It is being licensed to manufacturers and should be available within the year.

The hammer drill runs in the drill string immediately above a conventional rock bit. The hammer inside the tool weighs 200 lb. and delivers 600 or more percussive blows per minute. Pressure of the drilling mud supplies power. To make hole, the drill string is rotated slowly so that the bit teeth are positioned, hammered against the bottom of the hole, repositioned, and hammered again. The effect is about like the action of a star drill.

The hammer blows from the bit teeth have a shattering effect on the rock. And, the more shattering there is, the more efficient drilling is. So, for the same drill-collar weight on bit, drilling will be faster. Or, drilling rate will be the same with less collar weight.

Not all formations respond to the hammer action — soft formations which are plastic and do not shatter drill no faster than with conventional operation. The places where a hammer drill would be most successful are: (1) where formations are hard; and (2) where crooked-hole formations make it necessary to carry light weight on bit. These two conditions cover a large percentage of all drilling.

Gulf's present tool is an outgrowth of some 10 years of experiments. The company's engineers say that the drill can operate for 60 to 100 consecutive hours without being pulled from the hole. Any maintenance necessary, they say, can be done on the rig floor. In many tests, Gulf reports, the hammer drill has prolonged bit life 50 to 300 per cent.

New look in pumps . . . Another new tool introduced in 1957 was Cardwell Manufacturing Co.'s V-type mud pump. The pilot model is rated at 1,500-hp. but, the company says it can build a complete line of lower horsepower models. The pump is now getting its first field drilling trial on a South Louisiana well and results should come soon. If this trial is successful, the pump should be commercially available soon.

The new design has four single-acting pistons driven off a horizontal crankshaft. To make up for its short stroke, the new pump makes about 260 s.p.m. This is about four times the speed of a conventional double-acting duplex pump.

A big advantage of the Cardwell pump is its lightweight. It weighs only 15.5 lb. per horsepower while big standard-design pumps weigh 44 to 60 lb. per horsepower. Over-all dimensions are also small. As a result, the new pump should be easier to move and rig up and cheaper to buy.

Looking for a bit . . . Through most of 1957, the industry was looking at another new drill—the turbodrill. After that look, most are convinced of two things. First, the turbodrill is a working tool; it is rugged and can make hole faster than conventional operation. Second, to reach its full potential, it will require some kind of improved bit.

Early American-designed downhole turbines failed because the tools themselves were faulty. They needed repairs often, they were unreliable in operation, and some were inclined to come apart in the hole. This is not the case with the new turbodrill borrowed from the Russians. This tool is reliable, maintenance is simple, and it stays together. Trouble is that the turbine turns so fast that rock-bit bearings—intended for slower rotation—wear out quicker than usual. So, while a bit with a turbodrill makes hole faster, it may not drill so many feet of hole. And, trip time may cancel out the gain from faster drilling.

Among the bit ideas now being tried are diamond-core bits, insert-type chert bits, and new metallurgical approaches in rock bits. There could be a "breakthrough" at any time.

Cable-tool method returns . . . When air-and-gas drilling first started, everyone hoped it would be only a short time until someone found a cheap, sure way to shut off water from entering the hole. However, we've made little progress on this front. When all else failed, some operators turned to the old cable-tool idea of running a string of protective casing which could be retrieved later. While this method is certain to be more effective than most chemical squeezes used to date, it could cost more and take more time. As a result, it will be harder to justify economically.

Some are taking an opposite approach; they're trying to live with the water. That is, don't try to shut it off; try to blow it out of the hole while drilling without causing too much trouble. Usually this is done by injecting chemicals into the compressed air stream. Purpose of these chemicals is to prevent return water from heading and drilled particles from absorbing water and balling up. This "mist" drilling has a lot of promise and may become common practice after we have more experience with it.

Into deeper water . . . There was little fanfare for the 1957 development that may eventually mean more to the drilling industry than any other. That development was announcement by the CUSS (Continental, Union, Superior, Shell) operators that they have succeeded in drilling in water as deep as 1,500 ft. True, the wells were only strat and core holes and no attempt was made to complete the wells. Still, the work is a long stride toward opening up vast offshore areas which could some day be the working place for hundreds of drilling rigs.

CUSS drills through a hole in the middle of a full-floating ship. Wellhead is on the ocean bottom. Drilling tools are guided through the water by conductor pipe hanging from the ship and by steel wire lines.

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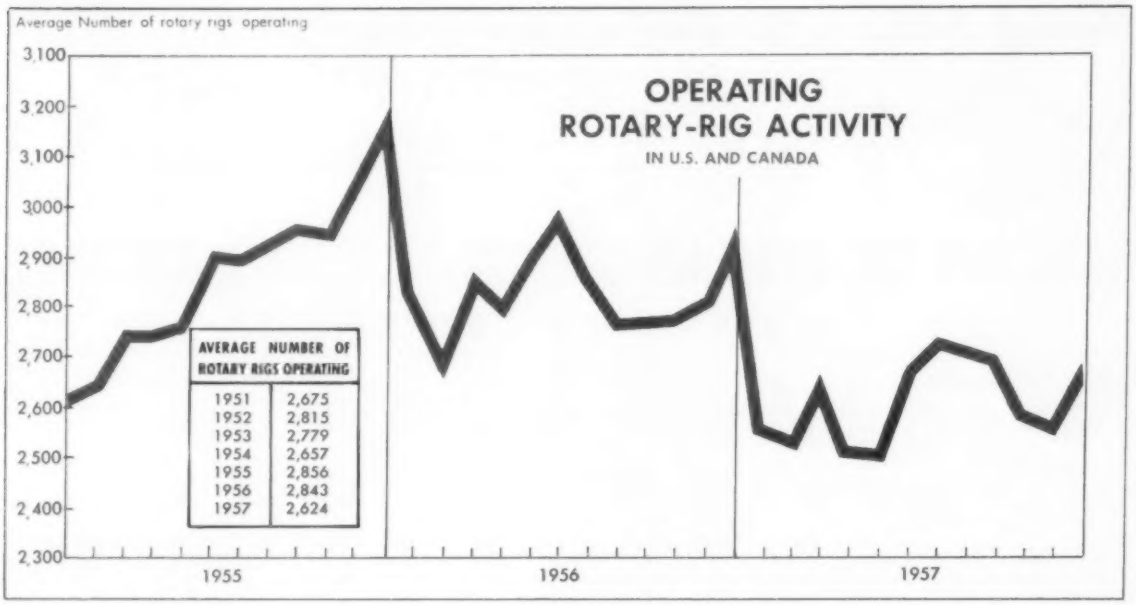

Rigs in use reflect decline in drilling

DRILLING DURING 1957 employed 219 fewer rotary rigs on the average than it did during the preceding year. This coincided with the decline in number of wells completed during the year as reported elsewhere in this issue.

There was, however, another slight increase in the average number of wells drilled per rig. Rotary rigs operating in the United States and Canada averaged 2,624 for the year. They drilled 48,877 of the 53,828 wells reported completed. This was an average of 18.67 wells per rig, compared with 18.24 wells per rig in 1956, and 17.96 wells in 1955.

The year's general decline in drilling activity reduced the average number of rigs in use to the lowest level since 1956. The greatest weekly average number reported in the Hughes Tool Co. survey at any one time (in mid-December) was 2,842. This was 290 under 1956's peak number of 3,132 rigs, and 496 under 1955's all-time record number of 3,338 rigs.

Although the greatest number of rigs operating at any time was at mid-December, as it has been in most years, the average for December was well under that of either July (the high month), or August, or September.

Rotary-rig activity by years

Year—	No. rigs Jan. 1	No. rigs Dec. 31	Peak number	Low number
1957	2,617	2,518	2,842	2,355
1956	3,023	2,759	3,132	2,619
1955	2,683	3,084	†3,338	2,574
1954	2,735	2,830	2,963	2,439
1953	2,775	2,795	3,079	2,580
1952	2,973	2,801	3,032	2,470
1951	2,406	3,066	3,181	2,119

*Based on Hughes Tool Co. weekly average figures. †All-time record number.

Rotary-rig activity by states

State—	No. rigs Jan. 1	No. rigs Dec. 31	Average number	Peak number	Low number
Arkansas	21	16	23	37	14
California	107	94	97	110	82
Colorado	42	35	47	69	34
Illinois-Indiana	53	34	56	86	19
Kansas	157	138	155	177	106
Louisiana	438	377	412	455	370
North Louisiana	42	39	53	67	36
So. La. (on-shore)	294	260	273	302	246
Offshore	102	78	97	111	77
Michigan	11	7	11	15	7
Mississippi	24	47	34	50	14
Montana	22	31	29	49	20
Nebraska	25	30	32	44	23
New Mexico	119	142	144	182	100
North Dakota	28	47	31	51	18
Oklahoma	253	227	243	378	198
Pennsylvania	10	8	12	17	6
Texas	974	952	951	1,075	830
Gulf Coast	243	217	209	249	163
West	352	352	371	423	338
North	314	324	316	373	215
East	65	59	54	76	41
Utah	30	48	47	71	29
Wyoming	51	67	65	85	45
Others	30	25	28	34	19
Total U. S.	2,395	2,325	2,429	2,652	2,233
Canada	222	193	195	254	99
Total	2,617	2,518	2,624	2,842	2,355

*Based on Hughes Tool Co. weekly figures.

POSTWAR WELL AND FOOTAGE RECORD

Footage drilled in '57 dropped slightly from '56

(Thousands in feet)

	1946	1947	1270	1283	1342	1522	1589	2111	2400	2629	3005	3389
Arkansas	728	1,409	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
California	7,509	8,764	10,579	10,443	7,966	9,566	10,313	11,355	10,923	12,724	10,566	9,786
Colorado	1,063	1,151	1,228	359	409	1,425	2,580	3,830	7,412	8,103	6,232	4,477
Illinois	5,925	5,251	6,386	6,362	6,311	6,044	5,312	5,425	7,613	9,303	8,771	6,198
Indiana	1,071	1,206	2,023	2,357	2,642	2,455	2,255	2,102	1,380	1,103	1,243	1,301
Kansas	6,556	8,690	10,634	10,715	12,744	15,035	15,520	16,217	16,328	17,597	17,103	15,272
Kentucky	1,175	1,194	1,515	1,853	2,076	2,412	2,568	2,355	2,284	2,372	2,748	2,168
Louisiana	8,464	8,709	10,934	12,477	14,554	14,189	15,662	19,125	21,987	26,085	28,438	29,998
Northern	3,175	2,912	4,128	4,453	4,626	4,741	4,815	4,530	5,923	6,460	6,083	5,285
Southern	5,289	5,797	6,806	8,024	9,928	9,448	10,847	14,595	16,064	19,625	22,355	24,713
Michigan	1,749	1,935	1,983	2,209	2,118	1,860	1,808	1,603	1,542	1,522	1,262	1,316
Mississippi	1,971	4,131	3,312	2,388	2,258	2,539	2,441	2,750	3,162	3,339	3,193	3,934
Montana	661	630	819	650	621	640	1,257	1,933	1,473	1,928	2,440	2,100
New Mexico	1,624	2,512	2,602	2,419	2,747	3,777	5,833	8,017	6,161	7,046	8,458	9,980
N. Y., Pa., and W. Va.	9,985	9,702	9,293	5,835	5,381	5,800	6,512	5,662	6,691	3,993	4,439	5,026
North Dakota					27	65	1,002	1,962	2,246	1,774	1,977	2,157
Ohio	3,402	3,913	3,498	2,286	2,172	2,057	2,295	2,274	2,391	2,642	2,583	2,689
Oklahoma	9,771	12,151	15,515	15,339	19,865	20,542	21,621	26,122	29,463	27,532	27,821	21,595
Texas	34,352	41,029	52,746	57,462	71,975	76,777	82,451	78,465	85,185	85,984	92,620	89,840
North Central (7-B & 9)	7,065	8,544	11,312	12,831	14,513	16,017	18,688	21,958	22,484	22,982	23,396	21,410
West (7-C & 8)	8,815	10,809	15,428	16,398	26,543	28,233	29,389	20,318	25,144	26,560	28,644	29,549
Panhandle (10)	943	1,593	2,053	3,015	2,804	2,307	2,123	2,555	3,211	3,720	5,202	5,639
Eastern (5 & 6)	3,792	3,070	3,383	4,992	4,928	5,603	4,455	4,209	5,590	4,884	5,682	6,685
Gulf Coast (2 & 3)	11,599	9,559	11,995	11,880	13,706	14,328	16,968	16,361	17,245	16,034	17,452	15,846
Southwest (1 & 4)	2,138	7,454	8,575	8,346	9,481	10,289	10,828	13,244	11,511	11,804	12,224	10,711
South Dakota	(*)	(*)	(*)	(*)	30	3	48	103	108	64	48	158
Wyoming	716	2,203	2,501	2,803	2,994	3,789	3,529	4,337	6,537	4,484	3,966	3,848
Miscellaneous	334	481	554	763	1,056	1,834	2,594	2,911	3,700	6,046	6,989	7,669
Total United States	**97,056**	**114,061**	**137,392**	**138,003**	**159,288**	**172,331**	**187,190**	**198,839**	**218,986**	**226,270**	**233,902**	**221,900**

. . . while completions dropped 4,222 wells

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Alabama	16	29	21	19	43	50	72	103	63	41	91	78
Arkansas	183	329	301	322	407	429	427	573	665	804	1,002	1,114
California	1,790	2,053	2,876	2,512	1,829	2,361	2,433	2,578	2,353	2,465	2,306	2,238
Colorado	167	209	207	82	99	289	486	734	1,358	1,509	1,222	855
Florida	28	35	26	24	13	2	10	30	31	30	13	9
Illinois	2,343	2,033	2,438	2,711	2,823	2,424	2,149	2,165	3,135	3,892	3,808	2,686
Indiana	582	681	1,082	1,279	1,534	1,369	1,277	1,280	887	706	741	754
Kansas	2,027	2,694	3,284	3,387	4,010	4,501	4,571	4,783	4,722	4,958	4,941	4,232
Kentucky	714	660	908	1,047	1,150	1,309	1,300	1,164	1,188	1,592	1,936	1,495
Louisiana	1,384	1,626	2,325	2,371	2,453	2,240	2,385	2,828	3,611	4,019	3,875	3,856
Michigan	788	909	895	995	897	746	707	623	567	512	437	455
Mississippi	260	491	428	334	313	375	348	397	441	448	441	386
Missouri					27	18	18	10	39	1	34	8
Montana	313	309	345	279	270	262	345	451	343	411	495	433
Nebraska	18	7	62	49	171	241	291	320	472	891	918	886
New Mexico	411	562	606	501	607	773	1,053	1,418	1,126	1,663	1,904	2,129
New York	1,544	1,531	1,344	882	657	627	767	696	435	378	512	443
North Dakota					3	12	122	270	312	250	263	316
Ohio	1,275	1,377	1,393	1,084	1,027	971	1,052	1,080	1,182	1,259	1,086	1,115
Oklahoma	3,050	3,846	4,293	4,352	5,459	5,626	5,781	7,593	8,786	8,411	8,056	6,235
Pennsylvania	3,584	3,238	3,159	1,920	1,581	1,738	1,884	1,507	1,331	717	748	833
South Dakota	(*)	(*)	(*)	(*)	12	1	14	20	23	16	9	44
Texas	7,804	9,301	12,251	13,665	16,585	16,655	16,845	17,019	18,865	19,981	21,519	21,352
Utah	4	4	18	49	17	39	79	70	91	92	141	267
West Virginia	755	882	846	518	652	622	606	618	614	640	693	680
Wyoming	168	267	584	587	615	745	700	917	1,221	915	930	863
Miscellaneous	20	49	86	69	25	91	99	32	69	81	39	76
Total United States	**29,228**	**33,122**	**39,778**	**39,038**	**43,279**	**44,516**	**45,821**	**49,279**	**53,930**	**56,682**	**58,160**	**53,838**

*Included in miscellaneous.

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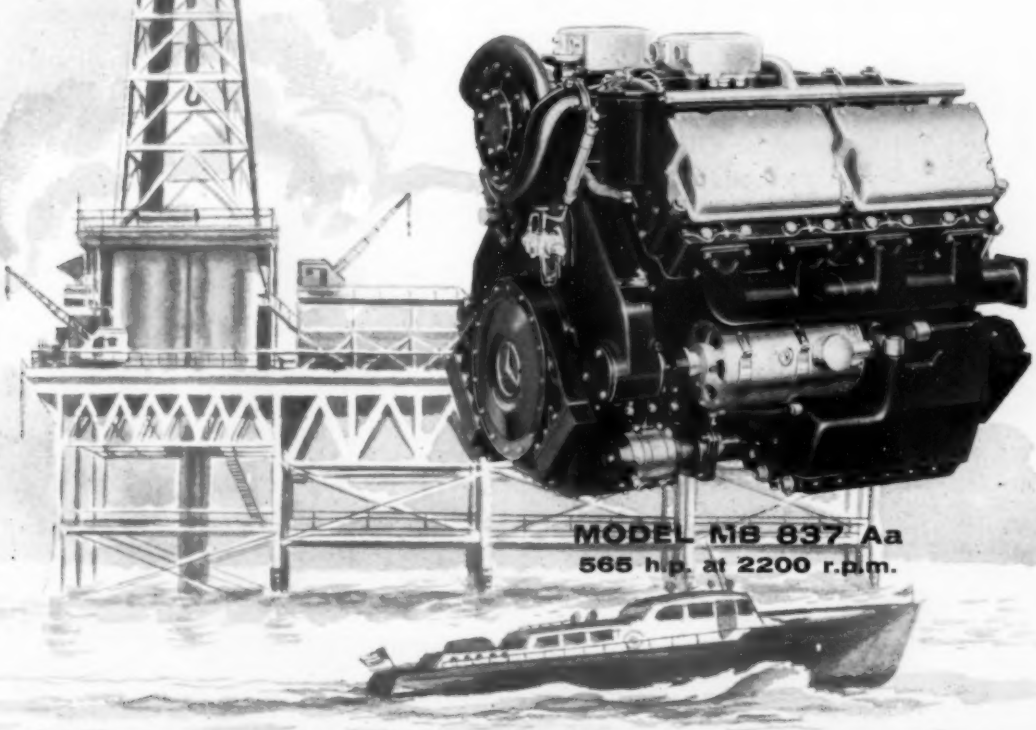

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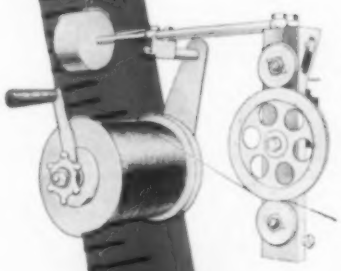

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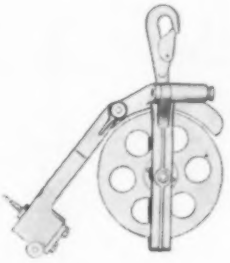

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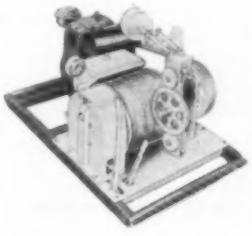

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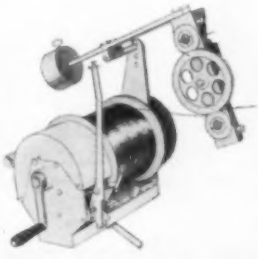
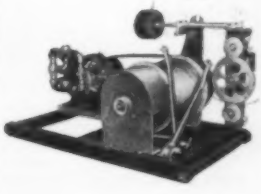


HEAVY DUTY MEASURING DEVICE... for measuring requirements, surveys, etc., where well depths are greater than line capacity of reel with Standard Measuring Device. Can be mounted to Jack Post on Rotary Rig for manual or "cathead" operation.



AIR POWERED MEASURING ASSEMBLY... driven by compressed air power for extra safety and flexibility. Especially suited for well measurements where there is a need for high starting torque, accurately controlled variable speed, or where a possible fire or safety hazard exists. Air motor used is a radial 5 cylinder unit with built-in gear reduction.

HALLIBURTON MEASURING EQUIPMENT

284 SERVICE CENTERS • JUST MINUTES AWAY FROM YOUR WELL

Wildcat completions drop by 1,295 wells

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Alabama	11	23	19	14	20	21	40	75	56	40	30	28
Arkansas	50	65	97	78	100	99	97	140	157	210	190	25
California	260	359	492	487	450	551	597	666	572	530	527	527
Colorado	21	51	46	48	56	143	245	364	657	811	675	550
Florida	26	27	23	19	10	2	10	30	30	29	13	9
Illinois	635	521	622	724	810	873	656	425	461	635	772	628
Indiana	118	156	327	471	510	559	424	373	224	261	145	155
Kansas	307	412	510	522	816	1,006	845	887	811	1,018	1,073	849
Kentucky	107	93	139	169	214	293	306	213	173	399	440	310
Louisiana	254	278	310	281	302	379	401	513	570	695	778	679
North	114	136	119	106	136	210	195	177	214	242	265	211
South	140	142	191	175	166	169	206	336	356	453	513	468
Michigan	247	275	313	344	338	332	277	279	243	212	168	152
Mississippi	79	94	108	115	130	174	182	207	178	182	220	194
Montana	47	42	30	45	49	50	98	126	123	172	195	185
Nebraska	14	7	30	18	82	134	168	161	185	415	451	474
New Mexico	44	47	71	74	79	105	165	168	156	158	278	267
North Dakota	....	....	....	....	3	12	36	91	117	69	78	149
Ohio	64	51	52	37	19	35	41	22	22	27	13	15
Oklahoma	573	843	831	804	840	830	730	742	859	832	867	747
Pennsylvania	....	21	24	6	4	10	20	20	46	16	19	18
South Dakota	(*)	(*)	(*)	(*)	12	1	14	20	22	16	9	44
Texas	1,591	1,895	2,568	2,791	3,443	4,408	4,851	5,245	5,190	5,124	5,610	5,004
North Central (9)	550	330	429	475	607	862	1,048	1,058	1,131	975	1,115	1,089
West Central (7-B)	55	276	469	592	729	1,019	1,035	1,062	971	1,035	1,075	973
West (7-C & 8)	224	213	314	343	669	844	870	876	938	839	898	872
Panhandle (10)	5	15	15	19	24	36	80	26	94	65	125	113
East (5 & 6)	114	137	142	186	223	255	252	300	334	367	431	387
Gulf Coast (2)	300	380	500	450	480	299	336	369	312	344	308	255
Gulf Coast (3)	75	37	79	81	83	363	390	519	526	517	562	440
Southwest (1)	68	107	80	95	98	249	348	432	385	481	498	431
Southwest (4)	200	400	540	550	530	481	492	603	499	501	598	444
Utah	3	4	18	19	13	32	50	42	65	71	86	121
West Virginia	....	104	82	24	43	17	14	23	51	30	27	33
Wyoming	54	67	104	131	122	141	173	189	271	262	289	310
Miscellaneous	13	26	61	73	29	95	112	41	41	57	81	266
Total United States	**4,518**	**5,461**	**6,877**	**7,294**	**8,554**	**10,302**	**10,552**	**11,062**	**11,280**	**12,271**	**13,034**	**11,739**

. . . but the average wildcat goes 100 ft. deeper

(Average in feet)

	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957
Alabama	4,529	4,146	5,260	4,657	4,368	5,380	5,722	5,257	5,221	4,878	8,789	9,316
Arkansas	3,979	4,282	4,218	3,984	3,296	3,549	3,721	3,684	3,609	3,270	2,997	3,042
California	4,195	4,269	3,678	4,157	4,356	4,052	4,239	4,443	4,642	5,162	4,581	4,373
Colorado	6,316	5,507	5,932	4,378	4,132	4,929	5,309	5,218	5,458	5,370	5,100	5,587
Florida	6,368	6,182	5,939	7,529	5,893	10,047	6,256	6,517	6,406	6,638	6,984	6,403
Illinois	2,529	2,583	2,620	2,347	2,236	2,493	2,472	2,506	2,428	2,390	2,303	2,308
Indiana	1,839	1,771	1,870	1,843	1,722	1,793	1,766	1,642	1,556	1,563	1,678	1,725
Kansas	3,234	3,226	3,238	3,459	3,178	3,340	3,395	3,391	3,458	3,459	3,462	3,609
Kentucky	1,625	1,810	1,668	1,770	1,805	1,842	1,976	2,033	1,922	1,490	1,419	1,450
Louisiana	6,116	5,357	4,703	5,262	5,933	6,334	6,567	6,763	6,064	6,490	7,339	7,779
Michigan	2,219	2,129	2,215	2,220	2,362	2,494	2,557	2,573	2,720	2,973	2,889	2,893
Mississippi	7,581	8,416	7,738	7,150	7,214	6,771	7,013	6,926	7,170	7,453	7,241	7,602
Montana	2,111	2,038	2,375	2,328	2,301	2,443	3,643	4,287	4,295	4,691	4,930	4,851
Nebraska, Missouri	1,980	1,689	709	2,240	3,191	4,083	4,447	5,039	5,137	5,603	5,490	5,826
New Mexico	3,951	4,470	4,293	4,828	4,526	4,886	5,539	5,654	5,471	4,237	4,443	4,687
New York	1,433	1,439	1,438	1,434	1,437	1,440	1,369	1,447	1,446	1,460	1,465	1,107
North Dakota	....	....	....	....	9,038	5,425	8,213	7,267	7,200	7,096	7,518	6,827
Ohio	2,669	2,842	2,511	2,110	2,115	2,119	2,181	2,105	2,023	2,098	2,378	2,412
Oklahoma	3,204	3,159	3,614	3,525	3,639	3,651	3,740	3,440	3,553	3,273	3,453	3,463
Pennsylvania	1,613	1,578	1,636	1,605	1,717	1,800	1,971	1,977	3,273	2,534	2,436	3,190
Texas	4,402	4,411	4,305	4,205	4,340	4,601	4,301	4,626	4,516	4,303	4,304	4,207
Utah	2,139	6,713	4,140	5,001	4,069	5,473	6,395	5,653	4,139	4,314	4,893	5,423
West Virginia	2,735	2,707	2,592	2,873	2,643	2,844	2,887	2,710	2,776	2,505	2,694	2,751
Wyoming	4,261	4,506	4,282	4,775	4,869	5,086	5,042	4,730	5,354	4,901	4,265	4,458
Miscellaneous	3,125	2,884	1,986	1,933	3,221	3,035	2,624	2,886	2,966	3,078	4,771	4,470
Total United States	**3,321**	**3,445**	**3,454**	**3,538**	**3,680**	**3,871**	**4,085**	**4,035**	**4,061**	**3,992**	**4,022**	**4,122**

*Included in miscellaneous.

Breakdown of footage of U. S. wells

	Field well			Wildcat		
	Oil	Gas	Dry	Oil	Gas	Dry
Alabama	564,963				1,641	160,059
Arizona					8,696	12,613
Arkansas	1,820,115	58,693	707,805	91,991	34,514	676,037
California	6,036,702	243,250	710,753	379,117	52,799	2,363,307
Colorado	590,878	397,031	615,813	194,259	109,100	2,569,545
Florida						57,625
Georgia						9,146
Idaho						5,900
Illinois	2,478,447	13,177	2,399,380	80,324	425	1,226,777
Indiana	470,069	12,592	570,521	15,968		231,787
Kansas	6,128,424	1,189,969	4,579,296	417,976	152,538	2,803,562
Kentucky	584,100	431,957	742,837	37,607	17,583	354,089
Louisiana	13,286,930	2,738,984	7,266,251	1,029,691	915,554	4,760,509
North	2,281,465	485,127	1,351,667	150,062	40,756	976,066
South	7,803,217	1,616,367	4,395,162	681,355	561,366	3,203,216
Offshore	3,202,248	637,490	1,519,422	198,274	313,432	581,227
Michigan	534,256	114,890	265,636	41,421	4,080	356,225
Mississippi	927,079	16,837	509,244	169,159		1,311,987
Missouri		1,152	6,691			2,381
Montana	977,546	25,753	199,546	73,929	7,272	816,297
Nebraska	1,536,997	3,336	965,191	267,213	3,306	2,422,596
Nevada						28,663
New Mexico	5,158,307	2,523,461	911,426	407,749	68,336	910,454
Northwest	884,883	2,396,496	165,951	114,671	41,613	297,348
Southeast	4,273,424	126,965	745,475	293,078	26,723	613,106
New York	208,000	7,844	228,232		10,814	35,312
North Dakota	1,245,893		100,794	177,375	184	633,132
Ohio	1,482,474	489,762	662,490	15,258	11,196	27,967
Oklahoma	11,644,690	1,074,381	5,525,301	637,328	178,465	2,534,444
Oregon						22,236
Pennsylvania	498,536	1,294,876	674,567		19,919	176,880
South Dakota				8,824		149,666
Tennessee		1,350			8,851	45,946
Texas	50,032,537	3,627,074	13,124,038	3,332,400	825,562	18,898,660
Dist. 1	1,300,650	172,498	488,864	80,890	83,957	1,150,799
Dist. 2	1,508,860	640,268	855,310	207,372	145,733	1,305,328
Dist. 3	4,985,002	413,052	2,218,973	497,155	238,072	2,830,639
Dist. 4	2,743,823	546,582	1,648,464	442,194	142,407	1,910,821
Dist. 5 & 6	3,556,480	295,887	843,963	109,466	14,157	1,865,035
Dist. 7-B	4,043,558	71,077	1,689,483	457,643	38,265	2,677,269
Dist. 7-C & 8	22,231,580	263,393	2,298,302	838,061	61,636	3,855,703
Dist. 9	6,081,636	384,735	2,628,120	534,144	76,910	2,727,264
Dist. 10	3,580,948	839,582	452,559	165,475	24,425	575,802
Utah	698,975	26,270	105,730	71,816	30,085	515,077
Washington				4,135		16,307
West Virginia	162,383	1,256,478	278,689		85,419	87,828
Wyoming	1,426,996	196,469	653,823	180,522	62,330	1,327,469
Virginia		56,418	4,970			
Total U. S. in 1957	108,495,297	15,802,004	41,809,024	7,634,062	2,609,669	45,550,483

. . . and of Canadian wells

Western Canada	8,237,050	511,233	968,198	532,630	476,823	2,955,435
Alberta	4,355,330	380,673	494,214	311,322	280,300	1,643,108
Saskatchewan	3,594,345	27,030	388,679	177,116	26,235	972,414
Manitoba	279,130		44,715	4,334		179,527
British Columbia	8,245	103,530	40,590	39,858	170,288	150,821
Northwest Territories						9,565

Where wildcats were drilled in 1957, and their depth classification

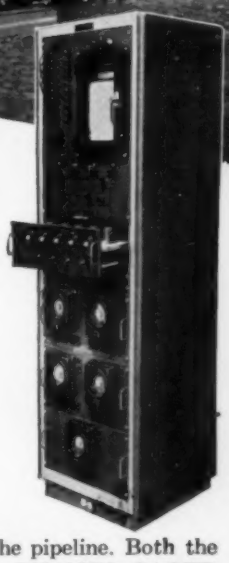
	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama											1								3	6	1	3	5	3	4	1	1
Arizona										3				1						2		2					
Arkansas		1	10	5	3	1		1				1	3	3					11	34	85	28	20	8		1	
California		10	3	5	10	18	6	6		1			1	5	2				45	66	79	71	92	62	36	7	2
Colorado			1	11	17	4	1				1		8	7	1			1	11	9	34	176	237	29	2		
Florida																					1	3	3	1		1	
Georgia																						2					
Idaho																				1		1					
Illinois	2	7	19	2						1									127	257	208	4	1				
Indiana	3	5	1																48	85	13						
Kansas		8	38	53	9						1		10	19					8	46	245	319	93				
Kentucky	9	7	6							1	3	2	1						174	76	29	2					
Louisiana		1	5	5	5	9	31	26	11	1		1		1	10	22	26	13	4	12	38	24	80	99	147	78	30
North		1	5	5	5	4	4			1		1		1	2	1			3	12	37	24	75	22	6	2	
South						2	22	20	9						4	15	14	10	1		1		4	66	120	61	28
Offshore						3	5	6	2						4	6	12	3					1	11	21	15	2
Michigan		5	8	1	1								1						6	57	52	21					
Mississippi				2	6	3	5	3												2	8	10	100	22	17	14	2
Missouri																			1	1							
Montana			2	1	2	3	2					2							9	27	34	37	43	13	9	1	
Nebraska				3	41							1							2	3	28	79	316	1			
Nevada																			3	2	3	1		1			
New Mexico	1	1	8	7	19	3	9	8			1	1		6	1			1	19	40	41	39	32	8	12	10	
Northwest	1	1	2	2	17									5	1				4	18	15	10	21	3	2		
Southeast			6	5	2	3	9	8			1	1		1				1	15	22	26	29	11	5	10	10	
New York												2	1									8					
North Dakota			2	2	11	7		2		1									2	1	43	33	25	17	2	1	
Ohio			2	2								2	1							2	3	3					
Oklahoma	5	5	14	16	36	25	2	3	1	1	3	2	7	14	3	1			77	84	124	109	147	54	13	1	
Oregon																						1		2			
Pennsylvania													1	1	1								13	2			
South Dakota						1													6	9	16	2	6	4			
Tennessee										3	1	1	1						12	8	5		3				
Texas	7	83	67	110	153	88	54	10	4	4	5	18	17	41	30	12	1	1	282	1,108	705	642	922	461	132	38	9
Dist. 1	1	4	7	1	2	3	1				2	3		2	2	4			89	127	89	39	36	11	4	1	3
Dist. 2				6	8	11	3			1		6	3	7	4	2	1		3	4	9	38	71	73	5		
Dist. 3					10	21	16	4	2	1			2	8	14	3		1	7	8	10	9	83	183	48	8	2
Dist. 4	1	3	7	8	24	20	3	1	1		2	2	5	4	7	2			23	26	52	41	141	48	19	3	1
Dist. 5 & 6				2	12	2	1						1		1				12	37	35	80	166	32	6		
Dist. 7-B	2	25	18	48	22					1		4	2	3					47	329	211	139	120	2			
Dist. 7-C & 8		13	12	19	26	21	26	5		1	1		4	4	2				32	104	126	151	181	78	39	24	3
Dist. 9	3	38	21	26	46	1						1		12					69	464	164	130	108	4	1	1	
Dist. 10			2		3	9	4		1			2		1		1				9	9	15	16	30	10	1	
Utah			1		9	2				1	1	1		4					9	13	9	12	46	12	1		
Washington				1																		1	2				
West Virginia											2		7	8							2	4	10				
Wyoming	3	2	3	5	12	7	1					3	1	2	3	1			27	40	26	44	85	34	10	1	
TOTAL U. S.	30	135	190	231	334	171	111	59	16	17	19	37	60	112	51	36	27	16	886	1,991	1,832	1,681	2,281	833	385	154	44
Western Canada		7	19	45	23	14	2				6	21	15	21	13	3	4		10	84	161	187	134	47	21	1	
Alberta		2	8	11	19	14	2				3	16	9	8	7	3	3		6	25	67	64	90	39	18		
Saskatchewan		3	11	28	2						3	4		1	1				4	29	56	112	37	5			
Manitoba		2																		26	36	3	1				
B. C.				6	2							1	6	12	6		1			2	2	8	5	3	3	1	
N. W. T.																				2			1				

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft. F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Canadian Seaboard Selects BS&B

Phanto-Matic

For Lease Production Automation



With BS&B, Ltd's completion of this installation in the Pembina Field near Drayton Valley, Alberta, the Canadian Seaboard Oil Company, of Calgary, became the first producing company in Canada to achieve *full lease automation* with a BS&B PHANTO-MATIC Lease System.

The PHANTO-PUMPER unit, housed in the partially completed building at left in the picture above, automatically handles the production from four wells which are connected to the production header assembly. It is here that wells are individually switched from production to test and data recorded on a strip chart, then switched back to production again. Also included in this unit are production and test separators.

From these separators the oil goes to a 300 bbl. surge tank (at right in the picture), and then to the 25 bbl. PHANTO-GAGER (center) which does the actual measuring of the oil to the pipeline. Both the PHANTO-PUMPER and the PHANTO-GAGER are skid-mounted units and are electro-pneumatically controlled. Illustration at right shows the PHANTO-PUMPER controls console.

Auxiliary equipment includes a standby generator which is automatically started in case of power failure to the lease, an air compressor to supply air to the pneumatically operated valves and a 3-pass indirect heater to heat oil going to the two separators and through the surge tank.

BS&B PHANTO-MATIC Lease Systems are available for handling lease production ranging from only a few wells up to a hundred or more, and may be purchased either as completely integrated systems or in component parts to supplement existing equipment. Ask your BS&B Man—or write for full information to . . .

BS&B

Black, Sivalls & Bryson, Inc.

Oilfield Equipment Division, Dept. 1-A1B

P.O. Box 1714 Oklahoma City, Okla.

New look *in the mud tank*

Do you recognize the *big change* in mud mixing?

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In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Ave., Toronto 10, Ont.

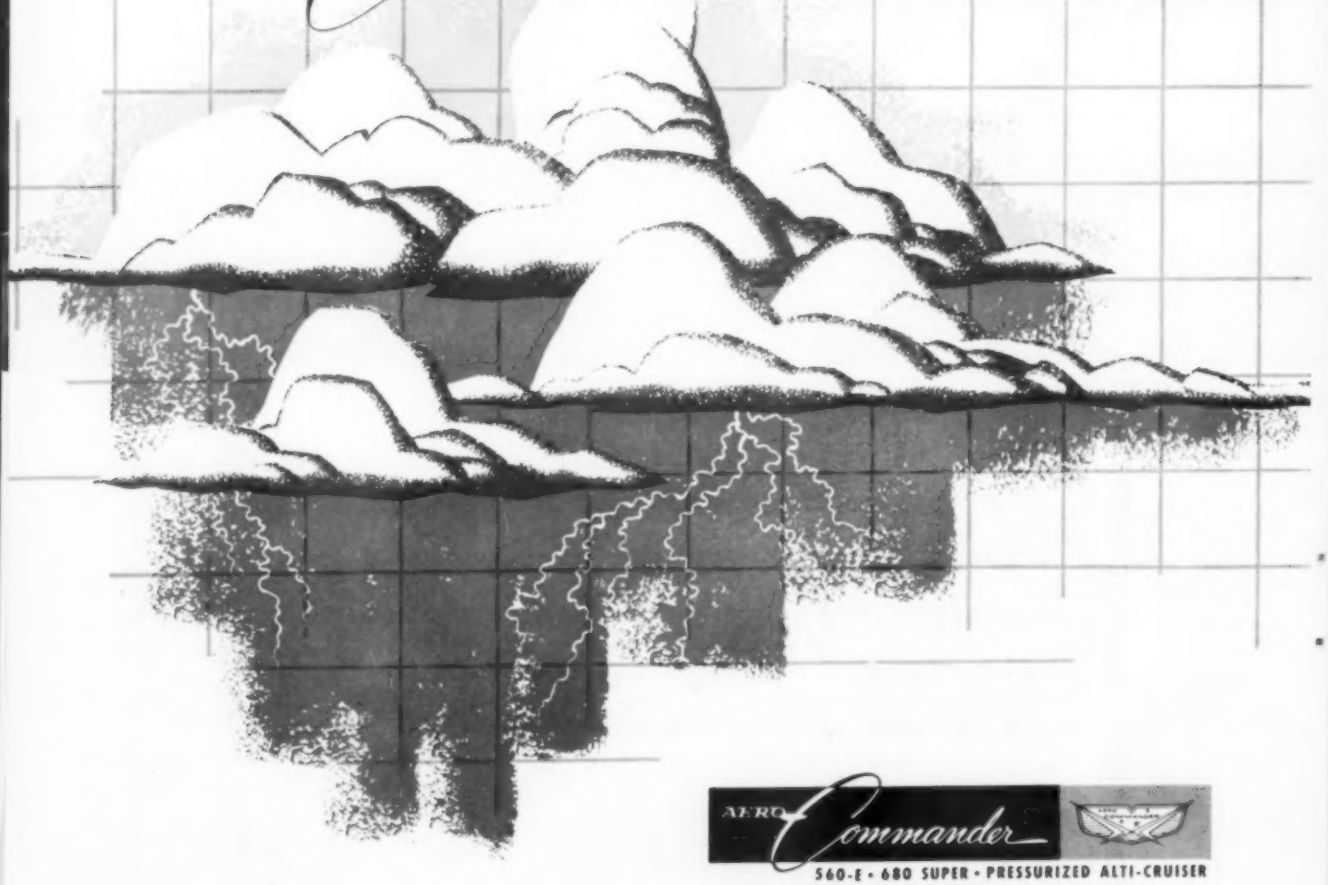
Where field development wells were drilled in 1957 and their depth classification

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama			1				49																				
Arkansas	15	460	138	55	15	5					2	3	3	6					4	28	99	43	17	6			
California	246	339	302	194	155	142	74	43	2			6	5	33					24	27	38	28	27	16	7	3	
Colorado	2	6	3	51	32	16				4	1	8	6	46	7	1			6	5	5	38	63	5			
Illinois	97	395	507	36						16	1	1							121	319	556	9					
Indiana	50	170	34							13	1								113	173	44	1					
Kansas	3	289	1,052	421	40						7	124	124	48					5	107	716	368	79				
Kentucky	287	178	22	2						15	38	73	31						265	211	57	6					
Louisiana	44	471	155	96	224	420	332	157	30	5	45	21	2	27	65	59	66	16	21	71	158	61	125	184	191	97	34
North	41	451	139	50	66	22	9			5	44	19	2	13	24	3			12	62	140	44	58	24	7	1	
South	3	20	16	40	91	194	251	143	30		1	2		8	22	28	51	15	8	7	16	16	45	108	130	76	30
Offshore				6	67	204	72	14						6	19	18	15	1	1	2	2	1	22	52	54	20	4
Michigan	2	37	71	40	15						10	34	2						1	31	42	13	5				
Mississippi				10	45	26	29	3					2	1						2		13	46	6	6	3	
Missouri										3										2	1						
Montana	3	41	39	5	31	60				7	2	3			1				4	11	21	11	6	3			
Nebraska			1	6	238	2						1									8	11	145				
New Mexico	15	138	224	360	156	32	118	14			118	167	85	214	12				21	45	48	46	14	13	14	8	
Northwest	2	33	12	23	122	2					117	155	73	213	9				7	23	11	6	9	1			
Southeast	13	105	212	337	34	30	118	14			1	12	12	1	3				14	22	37	40	5	12	14	8	
New York	208											1		1					220		1	1					
North Dakota			12	3	10	116	10														4	1	5	6			
Ohio	159	41	377	12						41	46	81	30						96	83	117	17					
Oklahoma	363	947	1,018	473	401	187	33	7		6	24	33	32	92	16				305	547	552	229	172	44	6	1	
Pennsylvania		302										181		108						156	68						
Tennessee											1																
Texas	952	2,448	3,146	1,990	2,266	897	271	82	1	10	141	184	86	208	91	30	2		424	1,112	539	536	592	279	48	13	
Dist. 1	189	172	147	39	25	11	1			8	3	14		3		9			43	84	33	14	15	2	1	1	
Dist. 2	12		6	46	92	77	3				3	28	26	42	21	1			3	5	12	53	47	28	3	1	
Dist. 3	41	48	74	121	196	235	73	1	1		3	11	11	11	15	12			22	27	51	38	83	126	19	1	
Dist. 4	20	68	113	57	195	70	12	2			11	26	19	32	21				13	51	52	38	121	49	2	1	
Dist. 5 & 6	85	105	76	96	316	67	2	1					4	31	9				21	20	14	34	82	7	1	1	
Dist. 7-B	141	447	214	289	191						9	4	7	2					99	229	89	119	59				
Dist. 7-C & 8	79	487	1,544	977	938	355	171	78		1	4	11	4	16	3	5	2		26	89	127	126	87	44	18	8	
Dist. 9	385	1,062	236	351	252	10				1	2	1	5	59					189	584	131	110	86	3			
Dist. 10		59	736	14	61	72	9				106	89	10	12	22	3			8	23	30	4	12	20	4		
Utah			1		120					1		1	1	1		1					3	1	16				
Virginia													5	6								1					
West Virginia	11	68	9							10	210	130	98	1					13	44	31	20	2				
Wyoming	32	50	83	44	80	35	4				3	6	7	10	10				51	22	43	27	32	12	2		
TOTAL U. S.	2,489	6,380	7,195	3,798	3,828	1,938	920	306	33	131	650	1,058	519	802	202	91	68	16	1,694	2,996	3,151	1,481	1,346	574	274	125	34
Western Canada		182	118	1,004	350	108				1	27	33	34	14	9	3			1	44	27	105	36	16			
Alberta		52	63	251	348	108				1	20	25	24	9	7	3				18	15	36	24	16			
Saskatchewan		5	48	751	2						7	3							1	4	10	62	11				
Manitoba		125	7																	21	1						
B. C.				2								5	10	5	2					1	1	7	1				

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft. F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

HIGH COMFORT

AERO Commander presents the world's first



AERO Commander

560-E • 680 SUPER • PRESSURIZED ALTI-CRUISER

AERO DESIGN & ENGINEERING CO

NEW AIRLINE COMFORT

Airline-type pressurization in the new Commander Alti-Cruiser makes altitude flying a comfortable reality in executive aircraft. The Alti-Cruiser heralds a new era of utilization for the company airplane! Favorable cruising altitudes can be maintained in complete comfort—without oxygen masks.

NEW ALL-WEATHER SAFETY

Now the executive team can fly safely over weather and out of congested traffic patterns in complete comfort—in the Commander Alti-Cruiser.

NEW MAXIMUM PERFORMANCE

At 15,000 feet, the pressurized, supercharged Commander Alti-Cruiser delivers maximum cruise performance with economy of operation. And yet, passengers enjoy the comfortable cabin altitude of an airplane flying thousands of feet lower.

PRESSURIZED *light twin business aircraft*

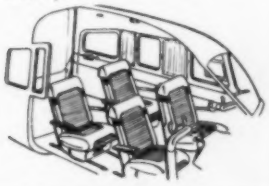
THE NEW SUPERCHARGED

AERO Commander ALTI·CRUISER

With All-Weather Air Conditioning

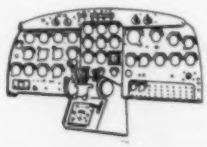
OPTIONAL LAVATORY COMPARTMENT AND EXCITING NEW INTERIORS

Flexible seating arrangements—4 to 7-place.



Complete lavatory compartment —optional

Deluxe airline-type reclining chairs with tuck-away arm rests.



New control quadrant and panel for greater operational efficiency.

TULAKES AIRPORT • BOX 118 • BETHANY, OKLAHOMA

Well tally—county, result, footage

ALABAMA
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Baldwin	0	0	3	24,204
Blount	0	0	1	3,883
Bullock	0	0	1	1,500
Clarke	0	0	1	15,350
Colbert	0	0	2	1,709
Escambia	0	0	3	24,044
Fayette	0	0	1	4,139
Franklin	0	0	1	510
Geneva	0	0	1	4,010
Greene	0	0	2	9,020
Lauderdale	0	0	1	2,058
Lawrence	0	0	1	1,605
Madison	0	0	0	†533
Marion	0	1	1	4,233
Mobile	0	0	1	13,365
Walker	0	0	1	1,853
Washington	0	0	4	41,793
Wilcox	0	0	1	6,069
Winston	0	0	1	1,822
Total	0	1	27	161,700

†Additional footage of old well drilled deeper.

ALABAMA
Development Completions by Counties

	Oil	Gas	Dry	Footage
Choctaw	1	0	0	3,414
Mobile	49	0	0	561,549
Total	50	0	0	564,963

ARKANSAS
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Arkansas	0	0	3	16,407
Boone	0	0	1	160
Bradley	0	0	2	5,662
Calhoun	0	0	3	11,530
Columbia	2	0	18	124,201
Conway	0	1	2	7,744
Crawford	0	1	0	5,475
Crittenden	0	0	1	3,494
Desha	0	0	1	5,640
Franklin	0	2	1	14,362
Hempstead	0	0	2	2,110
Jackson	0	0	1	4,936
Lafayette	8	0	24	143,093
Little River	0	0	2	3,096
Logan	0	0	1	7,025
Madison	0	0	4	3,661
Marion	0	0	1	275
Miller	4	0	27	126,174
Nevada	1	0	24	67,174
Ouachita	2	0	30	91,038
Pike	0	0	1	2,017
Pope	0	1	0	4,660
Randolph	0	0	1	925
Saline	0	0	1	50
Sebastian	0	2	1	15,420
Union	4	0	34	135,359
White	0	0	1	854
Total	21	7	187	802,542

ARKANSAS
Development Completions by Counties

	Oil	Gas	Dry	Footage
Calhoun	0	0	1	4,685
Columbia	99	0	15	325,712
Conway	0	2	0	4,316
Franklin	0	6	0	25,444
Johnson	0	0	1	2,412
Lafayette	38	0	36	275,879
Miller	26	0	29	222,543
Nevada	29	0	19	92,524
Ouachita	301	0	32	840,165
Pope	0	1	0	4,795
Sebastian	0	5	1	30,283
Union	195	0	63	757,855
Total	688	14	197	2,586,613

CALIFORNIA
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Butte	0	0	6	23,425
Colusa	0	1	6	36,577
Contra Costa	0	0	3	12,696
Fresno	6	0	29	276,835
Glenn	0	3	15	98,795
Humboldt	0	0	1	5,100
Kern	29	0	130	785,869
Kings	1	0	16	68,589
Los Angeles	4	0	32	201,873
Madera	0	1	7	38,116
Mendocino	0	0	1	4,060
Monterey	0	0	16	64,934
Orange	2	0	23	157,416
Riverside	2	0	7	19,493
Sacramento	0	1	3	19,963
Santa Barbara	2	0	26	147,196
San Benito	0	1	15	63,613
San Bernardino	0	0	8	22,854
San Joaquin	0	1	6	35,622
San Luis Obispo	0	0	8	40,005
Santa Cruz	0	0	3	15,866
San Mateo	0	0	10	29,575
Shasta	0	0	1	2,460
Solano	0	0	6	38,790
Sonoma	0	0	1	1,709
Sutter	0	0	6	20,291
Tehama	0	1	6	29,023
Tulare	0	0	21	57,380
Ventura	12	0	43	440,069
Yolo	0	0	5	37,029
Total	58	9	460	2,795,223

CALIFORNIA
Development Completions by Counties

	Oil	Gas	Dry	Footage
Butte	0	4	1	18,485
Colusa	0	11	0	65,943
Contra Costa	0	1	0	4,420
Fresno	116	1	12	561,893
Glenn	1	14	5	129,368
Humboldt	0	1	0	5,100
Kern	602	1	76	2,043,205
Kings	10	0	3	26,961
Los Angeles	242	0	21	1,262,341
Madera	0	1	0	4,550
Monterey	63	0	0	137,212
Orange	210	0	23	804,539
Sacramento	0	2	2	18,162
Santa Barbara	31	0	4	133,990
San Benito	5	0	1	20,371
San Bernardino	2	0	3	9,551
San Joaquin	1	5	0	26,930
San Luis Obispo	7	0	2	20,871
San Mateo	6	0	2	19,009
Solano	0	2	0	13,000
Tulare	6	1	1	12,028
Ventura	195	0	14	1,652,776
Total	*1,497	44	†170	6,990,705

*Includes condensate wells. †Includes service wells.

COLORADO
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Adams	1	0	14	105,554
Arapahoe	0	0	8	47,434
Archuleta	0	0	1	2,476
Baca	0	0	8	43,373
Bent	0	1	7	41,821
Boulder	0	0	1	5,663
Crowley	0	0	3	19,774
Delta	0	0	2	12,489
Elbert	0	0	10	67,210
El Paso	0	0	1	6,621
Fremont	0	0	3	7,597
Garfield	0	3	5	29,379
Grand	0	0	3	13,507
Jackson	1	0	4	26,372
Kit Carson	0	0	2	10,335
Kiowa	1	2	8	55,541
Larimer	1	0	7	30,042
Las Animas	0	0	3	11,208
La Plata	1	5	5	59,367
Lincoln	0	0	11	51,370
Logan	5	1	85	442,237
Mesa	0	1	9	18,143
Moffat	3	0	14	107,620
Montezuma	0	0	25	150,088
Morgan	0	1	26	153,478
Montrose	0	0	1	1,200
Otero	0	0	3	17,586
Park	0	0	1	7,475
Phillips	0	0	1	4,056
Pitkin	0	0	1	3,605
Prowers	0	0	8	43,188
Pueblo	0	0	1	5,174
Rio Blanco	1	2	14	105,583
Routt	1	0	2	12,816
San Miguel	0	0	1	5,419
Sedgwich	0	0	18	69,736
Washington	10	1	128	670,690
Weld	9	1	42	362,243
Yuma	0	0	12	45,434
Total	34	18	498	2,872,904

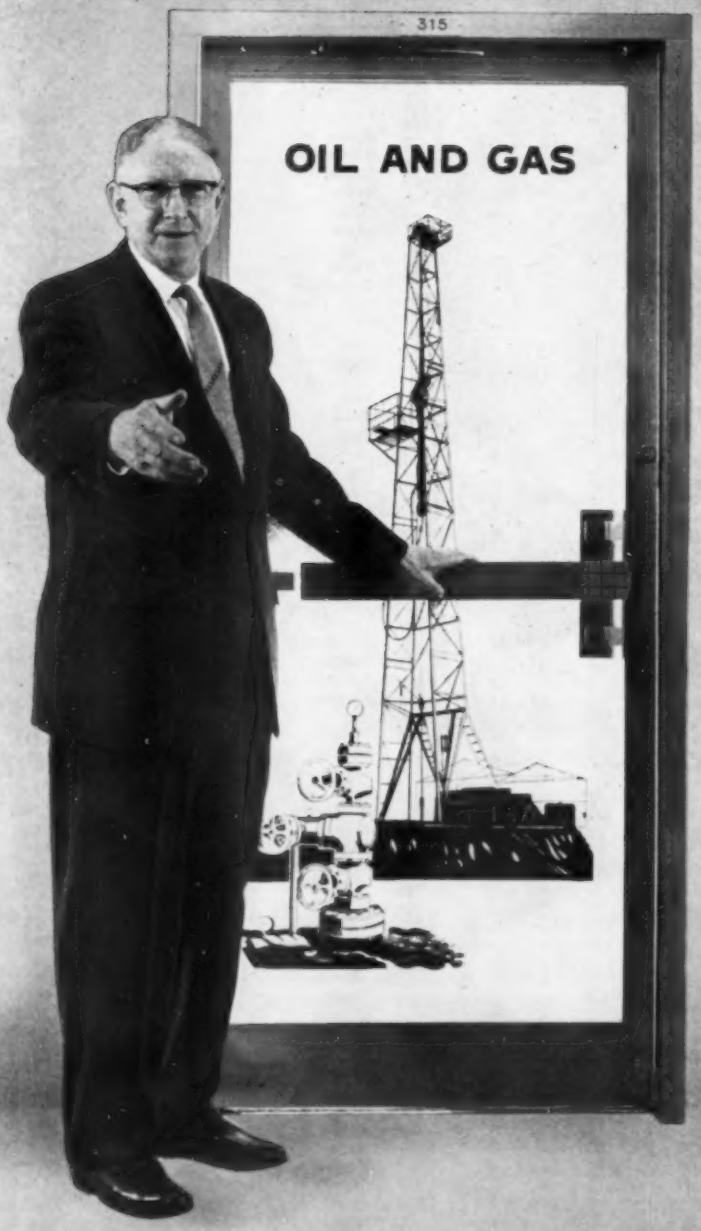
COLORADO
Development Completions by Counties

	Oil	Gas	Dry	Footage
Adams	5	0	1	36,082
Archuleta	2	0	0	1,260
Baca	0	1	2	15,407
Bent	0	0	1	5,540
Fremont	0	0	2	2,575
Garfield	0	4	3	26,675
Jackson	5	0	2	24,485
Kiowa	0	0	1	4,322
La Plata	0	45	2	281,068
Larimer	2	0	1	15,239
Logan	30	0	28	285,319
Mesa	0	2	2	13,661
Moffat	3	6	1	44,764
Montezuma	0	1	3	9,390
Morgan	10	2	13	132,055
Rio Blanco	1	11	4	52,975
Routt	3	0	2	15,865
Sedgwick	0	0	1	3,851
Washington	24	0	25	242,388
Weld	25	1	28	390,801
Total	110	73	122	1,603,722

FLORIDA
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Bay	0	0	1	4,612
Calhoun	0	0	1	4,650
Escambia	0	0	1	6,920
Holmes	0	0	2	13,276
Okaloosa	0	0	1	5,501
Santa Rosa	0	0	1	6,896
St. Lucie	0	0	2	15,770
Total	0	0	9	57,625

Bank of the Southwest



WELCOMES YOU, MR. OIL MAN

Harold Vance, vice president and manager, Oil & Gas Department, extends a warm welcome to you to visit the new, enlarged quarters of his department. Bank of the Southwest offers the ultimate in scope and quality of financing to the petroleum industry. The seasoned members of the Oil & Gas Department were oil men before they were bankers. A large number of our directors and advisory committee also are oil men. That's why our bank is known as the Oil Bank of the Southwest.

BANK OF THE SOUTHWEST, HOUSTON

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

1957 Wildcat and field drilling

GEORGIA

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Coffee	0	0	1	4,151
Decatur	0	0	1	4,995
Total	0	0	2	9,146

ILLINOIS

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Adams	0	1	8	7,029
Alexander	0	0	2	990
Bond	1	0	23	49,204
Brown	0	0	6	4,730
Bureau	0	0	1	2,702
Champaign	0	0	4	3,649
Christian	2	0	28	65,536
Clark	0	0	8	9,908
Clay	0	0	12	35,273
Clinton	0	0	48	102,201
Coles	0	0	15	17,878
Crawford	0	0	6	8,566
Cumberland	0	0	4	6,942
DeWitt	0	0	1	1,402
Douglas	1	0	26	41,387
Edgar	0	0	10	7,248
Edwards	0	0	3	9,507
Effingham	1	0	12	32,633
Fayette	1	0	14	32,421
Ford	0	0	6	4,317
Franklin	1	0	8	27,135
Gallatin	1	0	5	15,454
Greene	0	0	4	3,215
Hamilton	2	0	13	50,831
Hancock	0	0	5	4,816
Jackson	0	0	4	7,885
Jasper	1	0	10	30,757
Jefferson	3	0	10	36,627
Johnson	0	0	1	926
LaSalle	0	0	1	3,475
Lawrence	0	0	6	16,200
Macon	0	0	3	6,817
Macoupin	0	0	11	10,560
Madison	0	0	16	26,677
Marion	2	0	9	27,727
Mercer	0	0	2	4,060
Montgomery	0	0	41	66,883
Morgan	0	0	1	533
Moultrie	0	0	11	26,713
Perry	2	0	13	28,349
Piatt	0	0	1	2,031
Pike	0	0	10	5,933
Pope	0	0	3	4,523
Pulaski	0	0	1	167
Randolph	0	0	4	8,991
Richland	1	0	5	19,714
Saline	2	0	19	65,428
Sangamon	1	0	17	31,950
Schuyler	0	0	3	2,402
Shelby	0	0	21	46,322
St. Clair	0	0	8	13,885
Tazewell	0	0	1	1,080
Union	0	0	2	2,574
Wabash	1	0	6	20,550
Washington	2	0	32	65,374
Wayne	0	0	11	36,378
White	1	0	16	57,629
Williamson	4	0	26	83,432
Total	30	1	597	1,307,526

ILLINOIS

Development Completions by Counties

	Oil	Gas	Dry	Footage
Adams	0	1	2	1,469
Bond	14	0	34	67,840
Christian	63	0	34	181,711
Clark	49	0	30	98,709
Clay	45	0	52	269,591
Clinton	22	2	25	111,802
Coles	31	2	25	108,776
Crawford	82	2	79	217,571
Cumberland	1	0	1	1,925
Douglas	46	0	34	137,548
Edgar	3	0	4	6,155
Edwards	8	0	22	95,745
Effingham	11	0	21	84,777
Fayette	6	0	3	17,124
Franklin	37	0	24	192,872
Gallatin	49	0	26	191,387
Hamilton	79	0	94	538,459
Jasper	31	0	23	143,367
Jefferson	31	0	41	207,676
Lawrence	89	0	44	230,049
Macon	5	0	9	28,406
Madison	1	0	5	7,789
Marion	39	0	28	198,226
Montgomery	0	0	8	6,768
Morgan	0	0	1	360
Perry	6	0	12	23,819
Pike	0	8	5	7,066
Randolph	1	0	1	2,523
Richland	19	0	15	103,596
Saline	24	0	31	167,292
Sangamon	0	0	0	7,390
Shelby	5	0	5	23,521
St. Clair	1	3	3	2,802
Wabash	39	0	60	240,478
Washington	29	0	26	89,622
Wayne	89	0	72	525,468
White	74	0	91	505,782
Williamson	6	0	9	45,543
Total	1,035	18	1,005	4,891,004

INDIANA

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Bartholomew	0	0	1	367
Cass	0	0	1	946
Clay	0	0	6	8,459
Clinton	0	0	1	1,625
Crawford	0	0	2	2,115
Daviess	0	0	3	4,231
DeKalb	0	0	1	2,523
Delaware	0	0	1	1,241
Dubois	0	0	7	8,793
Gibson	3	0	7	21,363
Knox	0	0	11	25,506
LaGrange	0	0	1	3,483
Laurence	0	0	8	8,081
Martin	0	0	1	936
Miami	0	0	1	1,012
Monroe	0	0	1	2,371
Noble	0	0	1	477
Owen	0	0	1	1,300
Parke	0	0	1	741
Perry	0	0	3	1,185
Pike	2	0	14	21,599
Posey	1	0	14	36,502
Spencer	2	0	21	30,424
Sullivan	0	0	7	11,762
Tippecanoe	0	0	1	445
Vandenburg	1	0	4	9,693
Vermillion	0	0	1	1,552
Vigo	0	0	13	18,863
Warrick	0	0	9	15,611
Wayne	0	0	1	2,018
Whitley	0	0	2	2,531
Total	9	0	146	247,755

INDIANA

Development Completions by Counties

	Oil	Gas	Dry	Footage
Adams	0	2	0	2,181
Clay	2	0	1	4,753
Crawford	0	0	2	2,138
Daviess	0	0	3	2,936
Decatur	0	3	0	2,571
Dubois	6	0	7	12,193
Gibson	110	1	92	392,395
Hamilton	0	0	1	1,042
Hancock	0	1	0	1,023
Harrison	0	0	1	330
Jay	0	1	0	1,170
Knox	9	0	16	42,161
Martin	0	0	2	1,484
Miami	1	0	1	1,917
Perry	0	0	7	3,692
Pike	18	1	22	56,737
Posey	69	0	74	321,356
Rush	0	2	0	1,770
Shelby	0	1	0	881
Spencer	16	1	48	75,148
Sullivan	2	1	13	20,852
Vandenburg	16	0	36	90,896
Vermillion	1	0	2	4,025
Vigo	2	0	0	3,345
Wabash	1	0	0	864
Wells	1	0	3	5,322
Total	254	14	†331	1,053,182

†Includes service wells.

KANSAS

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Barber	2	5	26	160,837
Barton	2	0	10	38,669
Brown	0	0	1	4,020
Butler	3	0	14	42,401
Chase	0	0	5	12,645
Clark	0	1	7	45,088
Clay	1	0	7	18,393
Cloud	0	0	2	7,086
Comanche	0	1	3	22,794
Cowley	3	0	38	131,137
Decatur	2	0	7	35,384
Dickinson	0	0	5	13,494
Douglas	0	0	1	1,929
Edwards	1	1	10	57,330
Ellis	11	0	36	173,862
Ellsworth	0	0	8	27,787
Finney	3	2	2	33,817
Ford	0	0	9	45,948
Geary	0	0	2	4,183
Gove	0	0	4	18,016
Graham	16	0	34	199,922
Greeley	0	1	3	17,799
Greenwood	4	0	17	41,904
Hamilton	0	2	3	24,770
Harper	4	1	20	121,205
Harvey	1	0	20	72,393
Haskell	1	0	2	16,655
Hodgeman	1	0	17	84,538
Jackson	0	0	1	3,400
Kearny	1	0	1	10,350
Kingman	4	0	21	109,993
Kiowa	3	3	17	115,518
Lane	0	0	2	9,858
Lincoln	0	0	2	7,902
Logan	0	0	2	9,980
Lyon	0	0	4	11,171
McPherson	2	0	23	82,798
Marion	3	0	32	95,654
Marshall	0	0	1	2,116
Meade	1	5	10	93,657
Mitchell	0	0	2	7,892
Montgomery	1	0	0	1,731
Morris	0	0	6	17,779
Morton	1	3	12	79,969
Ness	1	0	13	62,889
Norton	1	0	10	40,988
Osborne	1	0	3	15,109
Ottawa	0	0	1	3,609
Pawnee	2	1	21	100,048
Pratt	3	0	14	75,321
Reno	0	0	9	36,457
Rice	0	0	12	41,667
Riley	0	0	1	2,060
Rooks	2	0	13	54,466
Rush	3	0	14	66,097
Russell	4	1	13	57,849
Saline	0	0	3	11,194
Scott	1	0	3	19,627
Sedgwick	5	0	29	120,587
Seward	0	1	4	30,102
Sheridan	0	0	15	63,035
Sherman	0	0	3	17,518
Stafford	10	0	9	76,358
Stanton	0	1	13	77,425
Stevens	0	1	2	19,570
Sumner	3	0	33	148,212
Trego	1	0	18	78,621
Wabaunsee	0	0	1	3,130
Wallace	0	0	1	5,338
Wichita	0	0	2	10,320
Woodson	0	0	2	2,705
Total	108	30	711	3,374,076

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Everybody appreciates quality. In LP-Gas carburetion it's especially important. Ensign vaporizers built of bronze alloy castings cost more to produce but are practically corrosive resistant and outlast others by many years.

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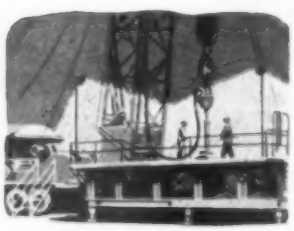

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1957 Wildcat and field drilling

KANSAS

Development Completions by Counties

	Oil	Gas	Dry	Footage
Barber	31	71	52	700,696
Barton	161	0	115	952,991
Butler	113	0	57	470,506
Chase	6	0	3	21,459
Clark	0	7	7	74,623
Clay	2	0	3	9,890
Coffey	2	0	5	12,904
Comanche	0	0	3	15,675
Cowley	138	2	94	731,573
Decatur	12	0	11	83,789
Dickinson	3	0	5	19,052
Edwards	2	6	2	43,943
Elk	3	0	1	12,172
Ellsworth	12	0	14	86,787
Ellis	192	0	148	1,246,786
Finney	5	64	5	219,913
Ford	0	0	1	5,132
Graham	115	0	81	761,017
Grant	0	4	0	10,537
Greenwood	113	0	49	347,507
Hamilton	0	4	2	15,566
Harper	24	9	10	195,648
Harvey	3	1	10	48,585
Haskell	2	0	2	23,123
Hodgeman	7	0	1	34,604
Kearny	0	13	1	40,821
Kingman	57	30	26	487,931
Kiowa	23	7	13	215,424
Lyon	4	0	7	24,275
McPherson	86	0	39	389,642
Marion	118	0	39	421,603
Meade	16	13	20	289,065
Morris	6	0	3	25,867
Morton	30	34	19	368,660
Ness	3	0	7	44,509
Norton	13	0	6	69,341
Osborne	1	0	2	10,436
Pawnee	19	2	10	129,697
Phillips	6	0	1	24,329
Pratt	7	6	17	130,173
Reno	9	0	6	56,022
Rice	65	4	32	338,351
Rooks	43	0	51	337,706
Rush	21	3	11	128,838
Russell	91	0	59	501,906
Saline	4	0	4	23,467
Scott	0	0	1	4,640
Sedgwick	67	0	66	436,351
Seward	0	9	6	67,631
Sheridan	4	0	5	35,098
Stafford	59	1	71	516,498
Stanton	0	4	4	32,610
Stevens	0	8	0	22,870
Sumner	46	1	32	274,206
Trego	38	0	28	253,109
Wabaunsee	1	0	1	6,524
Woodson	22	0	7	45,611
Total	*1,805	303	†1,275	11,897,689

*Includes condensate wells. †Includes service wells.

KENTUCKY

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Bell	0	1	0	3,571
Breathitt	0	0	3	5,070
Breckenridge	4	1	73	39,863
Butler	0	0	11	10,975
Caldwell	0	0	7	11,276
Christian	2	0	25	23,028
Clay	1	0	0	7,242
Crittenden	0	0	1	790
Daviess	5	0	17	34,247
Grayson	0	1	7	10,060
Hancock	0	0	7	7,418
Harlan	0	0	1	853
Henderson	0	0	20	44,091
Hopkins	4	1	15	48,879
Johnson	0	0	1	2,265
Knott	0	0	1	4,216
Laurel	0	1	0	3,532
Leslie	1	0	1	6,104
Livingston	0	0	1	2,100
Logan	0	0	1	990
McLean	1	0	14	25,386
Martin	0	0	1	4,709
Morgan	0	0	1	1,925
Muhlenberg	2	1	39	57,603
Ohio	1	0	24	28,895
Todd	0	0	2	1,921
Union	0	0	5	7,566
Webster	1	0	3	9,927
Wolfe	0	1	0	4,777
Total	22	7	281	409,279

KENTUCKY

Development Completions by Counties

	Oil	Gas	Dry	Footage
Bell	0	3	0	6,155
Breathitt	0	0	1	1,580
Breckenridge	74	0	118	81,138
Butler	3	0	5	4,272
Caldwell	0	0	1	1,650
Christian	43	1	41	73,504
Clay	0	0	1	3,710
Daviess	70	0	78	193,945
Floyd	0	11	2	27,514
Grayson	0	0	1	660
Hancock	1	0	4	3,235
Harlan	0	1	0	756
Henderson	77	0	63	249,425
Hopkins	10	3	8	42,243
Knott	0	18	0	53,385
Lawrence	2	12	3	28,001
Letcher	0	10	1	39,674
Magoffin	0	15	5	40,519
Martin	0	2	0	6,168
McLean	43	1	45	153,627
Meade	0	0	1	1,650
Muhlenberg	106	4	86	239,963
Ohio	7	0	14	14,822
Perry	0	4	0	12,257
Pike	4	71	8	277,970
Todd	1	0	0	883
Union	18	0	24	82,720
Webster	30	1	29	117,468
Total	489	157	539	1,758,894

LOUISIANA OFFSHORE

Wildcat Completions by Parishes

	Oil	Gas	Dry	Footage
Cameron	1	5	15	249,457
Jefferson	1	0	1	29,693
Lafourche	5	2	2	113,036
Plaquemines	2	5	18	291,034
St. Mary	1	1	1	39,350
Terrebonne	2	6	2	141,025
Vermilion	4	6	11	229,338
Total	*16	25	50	1,092,933

*Includes condensate wells.

LOUISIANA OFFSHORE

Development Completions by Parishes

	Oil	Gas	Dry	Footage
Cameron	12	21	13	491,211
Iberia	2	2	6	115,486
Jefferson	35	1	11	495,557
Lafourche	49	9	23	681,818
Plaquemines	206	15	54	2,405,216
St. Mary	32	4	16	522,363
Terrebonne	27	4	30	568,755
Vermilion	0	3	5	78,754
Total	*363	59	158	5,359,160

*Includes condensate wells.

NORTH LOUISIANA

Wildcat Completions by Parishes

	Oil	Gas	Dry	Footage
Bienville	1	0	10	40,675
Bossier	2	0	12	61,449
Caddo	2	1	8	41,022
Catahoula	2	0	28	175,869
Claiborne	2	0	6	61,593
Concordia	2	0	23	160,151

1957 Wildcat and field drilling

	Oil	Gas	Dry	Footage
DeSoto	2	1	17	85,533
East Carroll	0	0	2	10,719
Franklin	2	0	14	82,299
Grant	1	0	0	2,785
Jackson	0	0	2	8,803
LaSalle	1	0	10	53,043
Lincoln	0	0	1	10,060
Madison	0	0	2	10,759
Morehouse	0	0	1	6,888
Natchitoches	0	0	1	4,495
Ouachita	0	1	0	9,921
Red River	0	1	6	14,695
Richland	0	0	4	22,842
Sabine	0	0	2	3,448
Tensas	2	1	16	161,470
Union	4	0	7	102,360
Webster	0	1	6	27,250
West Carroll	0	0	1	2,705
Winn	1	0	2	6,050
Total	*24	6	181	1,166,884

*Includes condensate wells.

NORTH LOUISIANA

Development Completions by Parishes

	Oil	Gas	Dry	Footage
Bienville	14	5	26	188,763
Bossier	42	7	39	342,968
Caddo	413	20	56	1,131,445
Catahoula	10	0	16	120,898
Claiborne	43	8	19	434,287
Concordia	15	1	13	178,353
DeSoto	58	11	52	332,918
Franklin	10	0	18	113,824
Grant	4	0	3	12,677
LaSalle	26	1	22	139,475
Lincoln	0	2	1	27,349
Natchitoches	22	1	2	38,479
Ouachita	2	2	1	33,088
Red River	8	6	6	48,017
Richland	1	1	1	12,044
Sabine	29	3	26	161,894
Tensas	24	3	15	342,953
Union	0	35	2	98,748
Webster	44	4	27	338,061
West Carroll	0	0	1	2,938
Winn	13	0	2	19,080
Total	*778	110	348	4,118,259

*Includes condensate wells.

SOUTH LOUISIANA ONSHORE

Wildcat Completions by Parishes

	Oil	Gas	Dry	Footage
Acadia	5	1	22	312,341
Allen	2	2	19	217,427
Ascension	0	0	1	11,800
Assumption	1	0	3	55,932
Avoyelles	0	0	2	23,580
Beauregard	0	1	18	163,657
Calcasieu	2	6	14	237,192
Cameron	2	2	10	181,711
E. Baton Rouge	1	0	3	45,616
E. Feliciana	0	0	1	9,016
Evangeline	1	1	16	178,145
Iberia	1	3	6	137,858
Iberville	1	0	9	117,830
Jefferson	0	0	9	98,296
Jefferson Davis	4	4	13	224,930
Lafayette	0	1	2	46,760
Lafourche	6	5	25	482,892
Orleans	0	0	2	21,007
Plaquemines	6	4	24	411,669
Pointe Coupee	0	0	4	41,339
Rapides	0	0	2	12,010
St. Bernard	0	0	2	21,980
St. Charles	0	2	6	95,018
St. James	0	0	4	36,175
St. John the Baptist	0	0	5	52,814
St. Landry	1	0	6	73,388
St. Martin	1	0	6	91,361
St. Mary	4	1	9	197,392
Terrebonne	10	8	23	569,958
Vermilion	5	2	13	257,324
W. Baton Rouge	0	0	1	9,500
W. Feliciana	0	0	1	10,019
Total	*53	43	281	4,445,937

*Includes condensate wells.

SOUTH LOUISIANA ONSHORE

Development Completions by Parishes

	Oil	Gas	Dry	Footage
Acadia	25	8	37	700,060
Allen	9	7	12	249,649
Ascension	1	2	3	48,633
Assumption	19	8	11	484,056
Avoyelles	1	0	2	25,586
Beauregard	27	1	24	413,948
Calcasieu	31	7	32	581,601
Cameron	48	6	29	678,452
E. Baton Rouge	1	0	3	42,964
Evangeline	4	0	3	66,604
Iberia	27	7	14	532,912
Iberville	38	0	13	406,736
Jefferson	24	2	17	494,711
Jefferson Davis	10	8	9	299,094
Lafayette	1	3	5	123,259
Lafourche	104	15	41	1,747,509
Livingston	1	0	0	9,812
Plaquemines	150	14	31	2,070,123
Pointe Coupee	0	0	3	31,386
Rapides	1	0	2	16,035
St. Charles	16	0	9	255,210
St. James	2	1	1	45,537
St. John the Baptist	2	0	0	22,800
St. Landry	23	5	13	313,070
St. Martin	44	8	41	708,659
St. Mary	53	6	15	838,395
St. Tammany	0	1	0	9,990
Terrebonne	101	16	41	1,931,454
Vermilion	24	12	25	656,725
W. Baton Rouge	1	0	0	9,776
Total	*788	137	†436	13,814,746

*Includes condensate wells. †Includes one service well. Old wells drilled deeper not included.

MICHIGAN

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Allegan	1	0	16	34,109
Arenac	0	0	3	9,475
Barry	0	0	1	4,944
Branch	0	0	3	9,950
Clare	0	0	2	8,160
Gladwin	1	0	1	7,207
Gratiot	1	0	0	2,895
Hillsdale	1	0	2	10,362
Huron	0	0	2	7,264
Ionia	0	0	4	11,722
Isabella	1	0	2	6,429
Kalamazoo	0	0	2	4,256
Kalkaska	0	0	2	5,077
Kent	0	0	4	11,698
Lake	0	0	2	5,946
Lapeer	0	0	1	3,363
Mason	1	0	5	10,752
Mecosta	1	0	2	9,584
Midland	1	0	4	17,625
Missaukee	0	0	2	8,008
Montcalm	0	0	10	34,527
Muskegon	0	0	1	1,603
Newaygo	1	0	16	39,454
Oceana	2	0	25	62,001
Otsego	0	0	2	3,050
Osceola	0	0	6	23,248
Ottawa	1	0	7	11,626
Roscommon	1	0	1	9,710
Saginaw	2	0	3	14,165
	Oil	Gas	Dry	Footage
Sanilac	0	0	1	1,218
St. Clair	1	0	1	5,432
Van Buren	0	0	1	1,043
Wayne	0	0	1	1,743
Wexford	0	1	0	4,080
Total	15	1	136	401,726

MICHIGAN

Development Completions by Counties

	Oil	Gas	Dry	Footage
Allegan	19	35	26	199,257
Arenac	6	0	2	33,259
Barry	1	0	1	3,830
Bay	8	0	2	32,213
Clare	3	3	2	29,245
Crawford	2	0	0	8,554
Gladwin	21	0	6	116,379
Gratiot	1	0	3	10,492
Hillsdale	4	0	4	31,659
Isabella	4	0	1	15,638
Kalamazoo	3	0	3	7,929
Kent	1	0	0	1,890
Lapeer	0	1	1	2,979
Mason	3	0	1	8,503
Mecosta	1	1	2	9,048
Missaukee	0	0	1	5,178
Montcalm	26	0	10	116,384
Muskegon	2	0	1	5,570
Newaygo	2	0	6	20,847
Oakland	0	1	0	4,495
Oceana	2	1	7	21,488
Ogemaw	2	0	0	8,406
Osceola	16	4	1	78,593
Ottawa	11	0	1	21,744
Roscommon	5	0	3	39,826
Saginaw	9	0	1	26,323
St. Clair	0	0	2	5,251
Tuscola	12	0	1	39,290
Van Buren	1	0	1	2,470
Washtenaw	0	0	2	3,597
Wayne	0	0	1	4,445
Total	165	46	92	914,782

MISSISSIPPI

Wildcat Completions by Counties

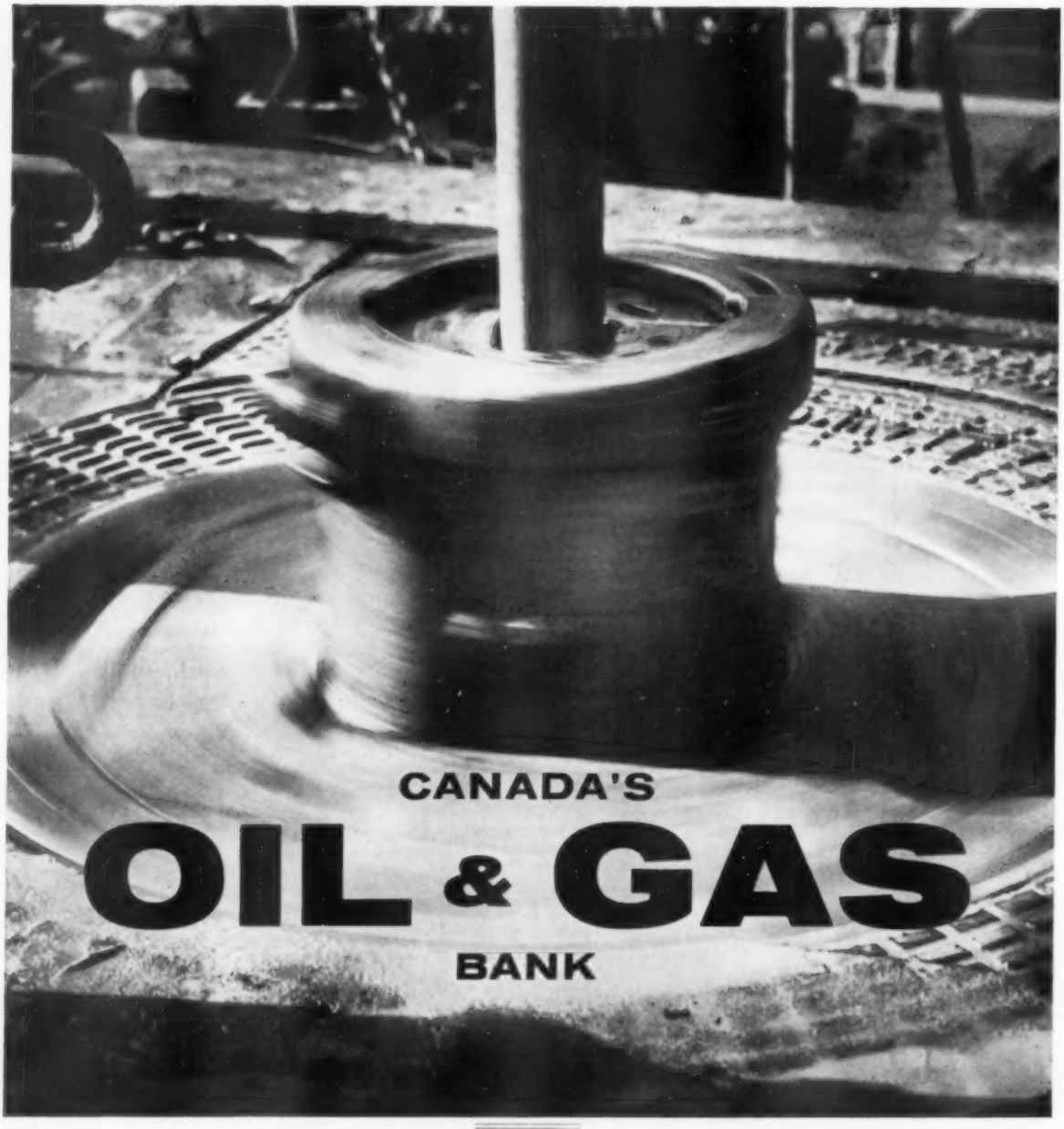
	Oil	Gas	Dry	Footage
Adams	4	0	39	279,067
Amite	0	0	2	12,619
Calhoun	0	0	1	3,384
Carroll	0	0	1	5,007
Claiborne	0	0	3	29,032
Clarke	0	0	5	38,110
Clay	0	0	1	5,280
Covington	0	0	2	30,430
Forrest	1	0	1	18,072
Franklin	1	0	7	55,191
George	0	0	1	11,009
Greene	0	0	7	79,378
Grenada	0	0	1	4,624
Hancock	0	0	1	10,006
Harrison	0	0	1	12,012
Hinds	0	0	2	13,105
Holmes	0	0	2	11,061
Issaquena	0	0	2	13,804
Jasper	0	0	5	33,088
Jefferson	1	0	19	126,521
Jones	1	0	4	48,301
Kemper	0	0	3	17,757
Lamar	0	0	3	28,055
Leflore	0	0	1	5,111
Lincoln	1	0	2	32,953
Madison	0	0	1	7,325
Monroe	0	0	1	5,499
Newton	0	0	2	9,908
Pearl River	0	0	4	42,823
Perry	0	0	2	24,399
Pontotoc	0	0	1	2,720
Rankin	0	0	3	28,253
Scott	0	0	5	28,286
Simpson	1	0	1	26,200
Smith	2	0	4	76,796
Wathall	1	0	0	13,868
Warren	0	0	1	12,569
Wayne	3	0	6	56,266
Wilkinson	3	0	25	208,017
Yazoo	0	0	3	25,240
Total	*19	0	175	1,481,146

*Includes condensate wells.

MISSISSIPPI

Development Completions by Counties

	Oil	Gas	Dry	Footage
Adams	20	0	30	327,380
Chickasaw	0	1	0	4,495



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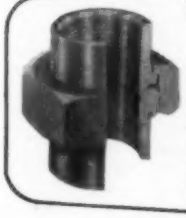

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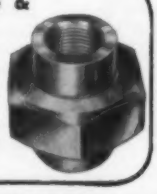

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Showing the Complete Catawissa line of Perfect Seal Products

CATAWISSA VALVE & FITTINGS COMPANY
450 MILL ST., CATAWISSA, PA.

1957 Wildcat and field drilling

	Oil	Gas	Dry	Footage
Clarke	6	0	5	50,717
Forrest	16	2	3	165,494
Franklin	4	0	4	57,848
Hancock	1	0	0	10,916
Hinds	7	0	0	81,741
Itawamba	0	0	2	3,000
Jasper	8	0	1	65,929
Jefferson	3	0	5	46,472
Jones	4	0	3	46,529
Lamar	1	0	0	8,854
Lincoln	3	0	1	43,833
Madison	0	0	4	27,422
Marion	1	0	0	13,624
Monroe	0	0	2	8,530
Pearl River	18	0	4	215,351
Sharkey	1	0	0	12,665
Simpson	1	0	1	25,919
Smith	4	0	0	48,060
Wayne	7	0	5	87,530
Wilkinson	8	0	6	100,951
Total	*113	3	76	1,453,160

*Includes condensate wells.

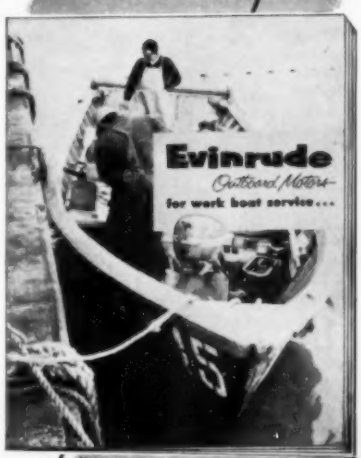
MONTANA
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Big Horn	0	0	5	33,751
Blaine	0	0	7	23,968
Carbon	0	0	4	14,161
Carter	0	0	1	5,160
Chauteau	0	0	1	3,750
Custer	0	0	5	36,738
Daniels	1	0	1	16,461
Dawson	1	0	2	28,128
Fallon	1	0	1	16,768
Fergus	0	0	7	17,547
Garfield	0	0	11	56,682
Glacier	1	0	7	45,384
Golden Valley	0	0	2	6,375
Hill	0	2	4	23,338
Judith Basin	0	0	4	9,229
Lewis & Clark	0	0	1	9,332
Liberty	0	0	3	8,260
McCone	0	0	1	9,532
Meagher	0	0	1	1,110
Musselshell	2	0	17	80,782
Petroleum	0	0	7	22,278
Phillips	0	0	1	3,791
Pondera	0	0	13	27,098
Powder River	0	0	8	42,219
Rosebud	0	0	19	99,420
Roosevelt	0	0	4	33,396
Sheridan	3	0	6	93,457
Stillwater	0	0	1	3,785
Teton	1	0	6	20,176
Toole	0	0	4	7,585
Treasure	0	0	6	36,188
Valley	0	0	1	7,499
Wheatland	0	0	4	7,720
Yellowstone	0	0	8	46,430
Total	10	2	173	897,498

MONTANA
Development Completions by Counties

	Oil	Gas	Dry	Footage
Big Horn	0	0	2	7,090
Blaine	12	1	2	50,790
Daniels	0	0	2	14,109
Dawson	2	0	0	18,100
Fallon	44	2	2	383,870
Glacier	19	3	9	96,788
Hill	0	0	1	3,508
Liberty	3	1	4	17,496
Musselshell	9	0	11	81,977
Petroleum	1	0	1	1,455
Pondera	4	0	3	14,380
Prairie	4	0	0	36,399
Roosevelt	12	0	1	77,784
Rosebud	3	0	4	35,470
Sheridan	3	0	1	37,501
Stillwater	0	0	1	3,799
Teton	6	0	3	15,813

new book



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1957 Wildcat and field drilling

	Oil	Gas	Dry	Footage
Toole	32	1	8	68,635
Valley	0	5	0	10,719
Wibaux	23	0	1	219,901
Yellowstone	2	0	0	7,261
Total	179	13	56	1,202,845

NEBRASKA

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Banner	17	0	115	811,587
Box Butte	0	0	2	8,468
Chase	0	0	2	8,606
Cheyenne	6	0	47	279,971
Dawes	0	0	7	23,999
Deuel	0	0	1	3,625
Dundy	1	0	1	10,150
Furnas	0	0	3	10,758
Garden	0	1	12	46,690
Harlan	0	0	5	20,633
Hayes	0	0	3	13,617
Kimball	16	0	122	899,565
Lincoln	0	0	1	4,374
Morrill	2	0	30	155,780
Red Willow	1	0	5	23,162
Richardson	0	0	10	30,257
Scotts Bluff	1	0	29	167,066
Sioux	0	0	34	174,807
Total	44	1	429	2,693,115

NEBRASKA

Development Completions by Counties

	Oil	Gas	Dry	Footage
Banner	57	0	45	634,919
Cheyenne	32	0	26	308,454
Deuel	0	1	1	6,822
Garden	2	0	4	24,944
Harlan	1	0	0	4,000
Hitchcock	0	0	1	4,018
Kimball	153	0	75	1,454,280
Morrill	2	0	5	35,591
Red Willow	0	0	1	3,661
Richardson	0	0	2	5,777
Scotts Bluff	0	0	4	23,058
Total	247	1	164	2,505,524

NORTHWEST NEW MEXICO

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
McKinley	0	0	19	49,874
Rio Arriba	3	0	13	84,694
Sandoval	4	0	7	58,510
San Juan	16	6	31	251,140
Torrance	0	0	1	446
Union	0	0	1	5,308
Valencia	0	0	1	3,660
Total	23	6	73	453,632

NORTHWEST NEW MEXICO

Development Completions by Counties

	Oil	Gas	Dry	Footage
McKinley	0	0	3	5,335
Rio Arriba	14	340	23	1,656,600
Sandoval	0	0	3	6,367
San Juan	180	227	28	1,779,028
Total	*194	567	†57	3,447,330

*Includes condensate wells. †Includes service wells.

NORTH DAKOTA

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Billings	1	0	0	8,148
Bottineau	4	1	42	172,510
Bowman	0	0	1	9,552
Burke	10	0	13	152,665
Burleigh	0	0	3	15,040
Dickey	0	0	1	3,167
Divide	1	0	2	24,968
Dunn	0	0	1	9,850
Grand Forks	0	0	2	2,187
Logan	0	0	9	29,253
McHenry	0	0	12	48,415
McIntosh	0	0	1	2,645
McKenzie	4	0	6	96,953
McLean	0	0	1	6,600
Mountrail	0	0	2	17,255
Nelson	0	0	1	1,660
Pierce	0	0	1	3,161
Renville	0	0	10	53,113
Rolette	0	0	3	11,632
Sheridan	0	0	3	12,590
Slope	0	0	1	9,024
Stark	1	0	3	36,935
Ward	1	0	3	27,351
Wells	0	0	1	3,822
Williams	2	0	2	52,195
Total	24	1	124	810,691

NORTH DAKOTA

Development Completions by Counties

	Oil	Gas	Dry	Footage
Billings	2	0	2	34,196
Bottineau	15	0	5	70,428
Burke	23	0	3	183,769
Divide	1	0	0	7,272
McKenzie	74	0	2	712,129
Mountrail	6	0	0	50,035
Ward	0	0	2	13,563
Williams	30	0	2	275,295
Total	151	0	16	1,346,687

OHIO

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Ashland	0	0	1	2,488
Ashtabula	1	0	0	3,440

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1957 Wildcat and field drilling

	Oil	Gas	Dry	Footage
Coshocton	2	1	2	19,108
Fairfield	0	0	1	2,453
Fayette	0	0	1	3,494
Holmes	0	0	1	3,690
Media	0	1	0	3,521
Morrow	0	0	1	3,800
Portage	1	0	0	4,395
Stark	0	1	0	4,238
Wayne	0	0	1	3,794
Total	4	3	8	54,421

OHIO

Development Completions by Counties

	Oil	Gas	Dry	Footage
Ashland	51	8	52	171,677
Ashtabula	1	0	0	2,801
Athens	5	13	13	26,458
Columbiana	4	0	4	6,893
Coshocton	100	8	16	408,160
Cuyahoga	0	3	0	6,835
Fairfield	4	0	0	10,601
Gallia	0	1	0	1,586
Guernsey	2	2	7	12,934
Harrison	0	10	2	15,382
Hocking	17	4	12	89,748
Holmes	35	22	22	257,905
Jackson	0	4	0	3,094
Jefferson	2	0	0	3,563
Knox	38	4	8	135,405
Laurence	0	1	0	2,832
Licking	85	4	17	267,858
Lorain	1	2	2	12,410
Medina	4	6	1	35,192
Meigs	4	15	5	30,104
Monroe	14	4	8	34,638
Morgan	1	15	10	28,657
Muskingum	57	8	10	251,962
Noble	9	2	15	21,682
Perry	42	2	12	168,775
Portage	0	1	1	8,483
Richland	0	1	4	12,913
Stark	0	6	1	29,374
Summit	3	12	2	58,221
Tuscarawas	40	2	9	67,056
Vinton	0	1	39	94,686
Washington	32	8	26	69,671
Wayne	38	29	13	284,152
Wyandot	0	0	2	3,018
Total	589	198	†313	2,634,726

†Includes service wells.

OKLAHOMA

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Alfalfa	5	0	11	88,645
Atoka	0	0	5	10,448
Beaver	8	5	6	150,243
Beckham	0	2	10	31,090
Blaine	1	0	0	7,940
Bryan	0	0	6	25,188
Caddo	0	1	6	38,986
Canadian	0	0	6	52,256
Carter	1	0	8	52,560
Choctaw	0	0	4	2,481
Cimarron	1	1	10	58,086
Cleveland	7	0	19	210,185
Coal	0	1	5	42,737
Comanche	2	0	20	47,884
Cotton	0	0	11	25,670
Creek	1	0	3	13,788
Dewey	1	0	1	24,904
Ellis	0	1	1	18,033
Garfield	4	0	9	70,464
Garvin	2	0	12	84,117
Grady	1	0	1	28,663
Grant	6	3	16	131,929
Greer	0	1	12	22,683
Harmon	0	0	1	7,908
Harper	5	2	9	109,350
Haskell	0	0	1	5,861
Hughes	0	1	5	21,163
Jackson	0	0	4	17,093
Jefferson	0	0	11	38,480
Johnston	0	0	8	36,262
Kay	3	0	24	101,791
Kingfisher	1	1	2	28,255
Kiowa	3	1	45	44,007
Lincoln	4	3	31	169,434
Logan	5	0	12	94,290
Love	3	0	6	54,867
McClain	5	0	5	92,184
McCurtain	0	0	4	5,939
McIntosh	0	1	1	5,671
Major	1	0	1	15,665
Marshall	2	0	5	42,406
Murray	0	0	9	19,263
Muskogee	0	1	4	14,454
Noble	2	0	17	86,224
Okfuskee	5	0	8	46,278
Oklahoma	0	1	8	52,349
Okmulgee	0	1	1	7,003
Osage	7	0	88	255,652
Pawnee	2	0	13	49,854
Payne	3	0	14	72,972
Pontotoc	0	0	9	32,620
Pottawatomie	2	0	23	129,595
Pushmataha	0	0	1	11,328
Roger Mills	0	0	1	12,341
Rogers	1	0	2	4,984
Seminole	0	0	4	16,923
Sequoyah	0	1	1	8,182
Stephens	5	2	12	124,924
Texas	1	0	3	21,447
Tillman	2	0	19	90,506
Wagoner	0	0	1	3,607
Washita	0	0	1	11,635
Woods	2	0	7	62,833
Woodward	3	1	6	85,657
Total	*107	31	609	3,350,237

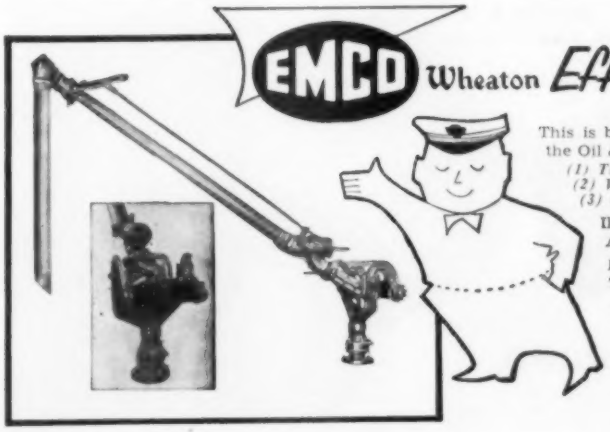
*Includes condensate wells.

OKLAHOMA

Development Completions by Counties

	Oil	Gas	Dry	Footage
Alfalfa	69	4	8	419,929
Atoka	0	0	1	672
Beaver	22	49	16	597,587
Beckham	17	7	13	47,369
Blaine	2	0	0	15,660
Bryan	0	0	3	12,154
Caddo	130	4	22	471,394
Carter	250	0	63	1,033,116
Cimarron	4	8	7	65,671
Cleveland	102	5	31	1,062,575
Coal	4	0	4	17,086
Comanche	42	1	41	83,516
Cotton	6	0	23	57,594
Creek	296	6	183	1,163,900
Ellis	2	0	0	17,167
Garfield	47	0	30	298,073
Garvin	178	1	81	1,172,373
Grady	30	5	16	289,722
Grant	32	13	18	311,620
Greer	5	0	5	11,431
Harper	31	14	9	342,663
Haskell	0	0	2	12,713
Hughes	71	6	54	256,287
Jackson	0	0	1	1,625
Jefferson	15	0	23	71,613
Kay	97	0	58	548,860
Kingfisher	13	0	1	90,990
Kiowa	63	1	76	88,831
LeFlore	0	1	2	15,839
Lincoln	86	12	60	598,229
Logan	85	2	25	579,545
Love	59	0	23	272,354
McClain	51	2	18	650,031
McCurtain	0	0	1	250
McIntosh	0	0	3	2,746
Major	0	0	1	7,351
Marshall	29	1	12	139,218
Murray	6	0	4	49,892
Muskogee	3	0	3	15,100
Noble	73	0	46	463,688
Okfuskee	106	5	61	498,411
Oklahoma	28	0	9	216,022
Okmulgee	144	3	115	453,576
Osage	575	2	331	2,177,192
Pawnee	69	0	43	276,124
Payne	60	0	44	360,579
Pittsburg	0	0	2	772
Pontotoc	47	4	28	136,074
Pottawatomie	50	0	33	347,925
Seminole	136	6	68	632,146
Sequoyah	0	1	0	6,160
Stephens	256	9	99	1,244,254
Texas	10	30	17	357,352
Tillman	24	0	14	123,457
Wagner	0	0	2	3,401
Washita	1	1	1	17,183
Woods	1	0	1	12,801
Woodward	2	0	1	24,509
Total	*3,429	203	†1,856	18,244,372

*Includes condensate wells. †Includes service wells.



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1957 Wildcat and field drilling

TEXAS
District 1
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Atascosa	2	2	42	162,841
Bastrop	1	0	16	42,981
Bell	0	0	1	1,005
Bexar	1	0	22	37,933
Caldwell	0	0	9	23,777
Dimmit	3	1	37	148,320
Edwards	0	0	2	10,126
Frio	1	0	19	89,874
Gonzales	3	0	18	93,644
Guadalupe	0	0	27	63,775
Hays	0	0	1	730
LaSalle	0	1	21	51,341
Maverick	4	1	34	81,275
McMullen	3	6	39	195,379
Medina	0	0	13	13,770
Menard	0	0	1	3,075
Milam	0	0	2	6,560
Travis	0	0	7	6,314
Uvalde	0	0	2	1,996
Val Verde	0	0	7	73,451
Williamson	0	0	12	15,235
Wilson	1	0	52	135,080
Zavala	0	2	15	57,164
Total	*19	13	399	1,315,646

*Includes condensate wells.

TEXAS
District 1
Development Completions by Counties

	Oil	Gas	Dry	Footage
Atascosa	63	3	22	372,052
Bastrop	7	0	6	25,832
Bexar	135	0	23	181,995
Caldwell	126	0	23	343,202
Dimmit	21	1	15	124,576
Edwards	0	0	1	1,000
Frio	19	12	9	155,654
Gonzales	0	0	8	25,716
Guadalupe	78	0	15	175,927
LaSalle	0	0	2	16,119
Maverick	11	1	7	30,140
McMullen	14	14	23	215,312
Medina	60	0	3	51,390
Milam	8	0	6	19,133
Travis	0	0	6	5,466
Val Verde	0	4	0	41,258
Wilson	41	2	22	163,879
Zavala	1	0	2	13,361
Total	*584	37	193	1,962,012

*Includes condensate wells.

TEXAS
District 2
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Bee	5	7	29	201,915
Calhoun	1	3	20	206,484
DeWitt	2	0	13	116,513
Goliad	3	4	16	133,105
Jackson	5	2	32	291,679
Karnes	1	0	15	106,856
Lavaca	0	0	3	26,242
Live Oak	5	4	39	269,318
Refugio	4	1	20	181,360
Victoria	2	3	16	124,961
Total	*28	24	203	1,658,433

*Includes condensate wells.

TEXAS
District 2
Development Completions by Counties

	Oil	Gas	Dry	Footage
Bee	24	24	40	407,546
Calhoun	23	9	4	306,160
DeWitt	15	4	6	202,144
Goliad	10	12	12	189,843
Jackson	37	5	18	442,198
Karnes	13	0	5	107,368

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Best way to answer these and many other questions affecting your heat-exchanger tube selection is to ask Bridgeport. Our 60 years of tube manufacturing and corrosion research, backed by modern methods and facilities, have led to the development of a wide range of tube alloys to meet virtually every corrosion problem. Here are some of the standard tube alloys Bridgeport offers:

Admiralty—Good corrosion resistance to most types of circulating water at low velocities. Resists dezincification. Excellent corrosion resistance to clean fresh water and certain types of industrial and sewage pollution. A common choice for refinery heat exchangers where sulfides are present in petroleum streams.

Aluminum Brass—Excellent corrosion resistance to sea water. Resists impingement corrosion where water velocities are high. Excellent corrosion resistance to chlorinated sea water when chlorine is used for slime control. Excellent corrosion resistance to clean and polluted fresh water. Ideal for severe operating conditions.

Copper—Good general corrosion resistance. Good impingement corrosion resistance where water velocities are low. Immune to dezincification. Successfully handles esters, fluorides, oxygen, hydrogen, etc. Excellent heat-transfer rate. Widely used for heat exchangers, evaporators and condensers.

Cupro Nickel—Considered the best copper-base alloy for all-around corrosion resistance toward saline waters. Has unusually high strength at elevated temperatures.

Aluminum Bronze—Good general resistance to impingement and corrosion in brackish water and in areas where water is contaminated by acid wastes. Handles non-oxidizing salt solutions, glycols, esters, halogen derivatives, etc.

Red Brass—Good corrosion resistance in fresh water. Excellent resistance to dezincification. Satisfactorily handles chlorinated organic compounds.

Muntz Metal—Similar to Admiralty in resisting sulfur corrosion. Resists dezincification in sea water, brackish water and most fresh waters.

Duplex—The ideal answer to many dual corrosion problems. Widely used in exchangers handling hydrogen sulfides, chlorides, ammonia and various petroleum products. A range of over 101 combinations available for all refinery and chemical processes.

Bridgeport's Technical Service and Corrosion Laboratories are at your service to help you with specific problems. Call your nearest Bridgeport Sales Office for complete information.

The Bridgeport Condenser Tube Handbook *has 162 pages of valuable information on corrosion and how to combat it. Write for a copy.*

Bridgeport Brass Co.

BRIDGEPORT CONDENSER TUBES

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In Canada: Noranda Copper and Brass Limited, Montreal

1957 Wildcat and field drilling

	Oil	Gas	Dry	Footage
Lavaca	7	8	6	162,678
Live Oak	56	5	37	438,527
Refugio	38	37	12	514,589
Victoria	13	17	12	233,385
Total	*236	121	152	3,004,438

*Includes condensate wells.

TEXAS
District 3
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Austin	1	0	5	58,093
Brazoria	0	0	26	238,126
Brazos	0	0	1	5,035
Chambers	8	6	25	371,142
Colorado	0	1	7	71,644
Fayette	0	1	15	46,485
Fort Bend	0	0	21	169,623
Galveston	5	0	16	207,061
Grimes	0	0	1	1,983
Hardin	4	5	10	164,898
Harris	6	6	67	623,080
Houston	0	1	0	9,687
Jasper	1	0	5	46,850
Jefferson	5	1	32	326,022
Lee	0	0	3	12,124
Liberty	1	1	18	206,203
Madison	1	0	1	21,108
Matagorda	5	2	25	301,667
Montgomery	4	1	19	162,211
Newton	4	0	5	74,313
Orange	0	0	8	67,570
Polk	1	0	1	14,071
San Jacinto	1	0	4	42,305
Trinity	0	0	2	20,106
Tyler	2	0	11	71,326
Walker	0	0	3	15,884
Waller	0	0	1	7,500
Wharton	2	4	26	209,749
Total	*53	29	358	3,565,866

*Includes condensate wells.

TEXAS
District 3
Development Completions by Counties

	Oil	Gas	Dry	Footage
Austin	6	0	5	64,982
Brazoria	58	2	36	641,261
Brazos	0	1	1	5,473
Chambers	53	2	23	632,025
Colorado	21	12	12	393,685
Fayette	0	0	2	4,687
Fort Bend	27	2	25	314,063
Galveston	38	1	10	329,398
Hardin	83	2	36	429,155
Harris	191	6	54	1,627,080
Jasper	6	0	5	87,248
Jefferson	33	2	24	369,498
Liberty	113	4	41	1,038,056
Madison	6	0	0	56,202
Matagorda	54	7	17	478,343
Montgomery	12	3	9	134,680
Newton	18	3	7	227,626
Orange	34	2	14	284,982
Polk	3	0	0	19,051
San Jacinto	1	0	0	11,750
Trinity	0	0	1	7,102
Tyler	4	0	5	52,272
Walker	0	0	1	3,864
Waller	8	0	4	80,229
Washington	0	0	4	29,965
Wharton	21	14	31	294,170
Total	*790	63	367	7,617,027

*Includes condensate wells.

TEXAS
District 4
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Aransas	1	0	3	34,588
Brooks	5	0	4	63,414
Cameron	1	0	4	51,739
Duval	13	2	70	397,094
Hidalgo	8	2	18	236,613
Jim Hogg	5	0	24	123,286
Jim Wells	6	2	37	255,056
Kenedy	1	3	9	108,950
Kleberg	1	1	7	89,715
Nueces	10	2	36	354,640
San Patricio	5	1	45	354,514
Starr	10	7	49	231,305
Webb	2	1	31	117,956
Willacy	0	1	2	27,680
Zapata	0	0	15	48,872
Total	*68	22	354	2,495,422

*Includes condensate wells.

TEXAS
District 4
Development Completions by Counties

	Oil	Gas	Dry	Footage
Aransas	2	1	4	55,254
Brooks	21	6	13	258,442
Cameron	0	1	1	17,100
Duval	137	17	77	793,796
Hidalgo	49	11	21	609,580
Jim Hogg	38	3	13	185,019
Jim Wells	32	13	34	432,990
Kenedy	4	2	2	60,557
Kleberg	34	2	8	368,913
Nueces	80	17	48	951,590
San Patricio	52	19	34	614,962
Starr	47	13	51	418,980
Webb	25	3	14	113,847
Willacy	3	0	0	21,865
Zapata	13	1	7	35,974
Total	*537	109	327	4,938,869

*Includes condensate wells.

TEXAS
Districts 5 and 6
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Anderson	5	0	74	455,654
Angelina	0	0	3	11,345
Bowie	0	0	5	21,040
Camp	0	0	1	4,106
Cass	1	0	3	27,387
Cherokee	2	1	52	303,779
Collin	0	0	2	19,961
Dallas	0	0	1	800
Delta	0	0	1	3,800
Ellis	0	0	4	5,464
Falls	0	0	4	11,004
Fannin	0	0	1	3,200
Franklin	0	0	1	7,048
Freestone	2	0	8	55,635
Harrison	1	0	10	77,543
Henderson	1	0	24	136,570
Hill	0	0	3	10,922
Hopkins	0	0	1	8,504
Houston	0	0	17	105,505
Hunt	0	0	7	38,117
Kaufman	0	0	10	43,452
Lamar	0	0	2	4,558
Leon	0	0	5	37,787
Limestone	0	0	11	28,861
McLennan	0	0	4	4,360
Marion	1	0	3	24,817
Nacogdoches	1	0	5	39,340
Navarro	0	1	22	71,406
Panola	0	0	2	14,329
Rains	0	0	2	9,968
Red River	0	0	13	29,305
Robertson	1	0	5	37,756
Rockwall	0	0	4	9,375
Rusk	1	0	9	61,827
Shelby	0	0	4	30,194
Smith	1	0	8	53,504
Titus	0	0	1	5,688
Upshur	0	0	11	57,551
Van Zandt	0	0	9	31,337
Wood	0	0	16	85,859
Total	17	2	368	1,988,658

TEXAS
Districts 5 and 6
Development Completions by Counties

	Oil	Gas	Dry	Footage
Anderson	94	1	36	696,679
Cass	44	1	11	345,402
Cherokee	14	2	17	165,747
Ellis	39	0	4	27,626
Falls	0	0	2	2,563
Franklin	3	0	2	37,261
Freestone	4	3	7	72,253
Gregg	11	3	1	91,473
Harrison	162	11	14	776,472
Henderson	2	0	3	19,604
Hill	0	0	1	1,908
Hopkins	3	0	1	20,860
Hunt	2	0	0	6,106
Kaufman	0	0	2	8,143
Leon	1	1	1	21,560
Limestone	1	0	2	7,464
McLennan	2	0	0	941
Marion	44	2	9	332,481
Nacogdoches	4	0	0	25,527
Navarro	49	0	18	98,322
Panola	85	15	14	590,443
Red River	6	0	2	17,521
Rusk	83	5	10	573,229
Shelby	2	0	1	10,812
Smith	53	0	10	485,456
Titus	0	0	2	6,668
Upshur	1	0	0	3,712
Van Zandt	5	0	3	16,728
Wood	34	0	7	233,369
Total	748	44	180	4,696,330

TEXAS
District 7-B
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Brown	4	0	13	26,961
Callahan	6	1	105	242,153
Coleman	8	1	53	157,307
Comanche	0	0	5	14,778
Coryell	0	0	2	12,825
Eastland	2	1	18	56,386
Erath	0	0	3	10,746
Fisher	5	0	34	232,316
Hamilton	0	0	1	6,399
Haskell	6	0	75	257,531
Jones	15	0	92	334,197
Lampasas	0	0	1	1,022
Mills	0	0	3	6,915
Nolan	10	0	46	343,956
Palo Pinto	4	0	12	49,964
Parker	0	4	3	26,348
San Saba	0	0	1	1,685
Shackelford	15	0	67	185,128
Stephens	7	3	44	205,875
Stonewall	5	0	23	165,724
Taylor	11	0	105	364,267
Throckmorton	17	0	142	470,694
Total	115	10	848	3,173,177

TEXAS
District 7-B
Development Completions by Counties

	Oil	Gas	Dry	Footage
Brown	56	3	35	122,869
Callahan	78	0	53	233,167
Coleman	103	1	52	381,904
Comanche	1	2	3	15,347
Eastland	39	1	17	127,370
Erath	1	0	4	18,959
Fisher	105	0	35	611,872
Haskell	37	0	15	229,587
Jones	117	0	44	520,645
Nolan	122	2	24	900,274
Palo Pinto	12	0	14	58,373
Parker	2	3	1	24,037
Shackelford	193	5	112	503,335
Stephens	96	5	52	473,735
Stonewall	58	0	15	392,855
Taylor	149	0	65	663,521
Throckmorton	113	0	54	526,268
Total	1,282	22	595	5,804,118

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1957 Wildcat and field drilling

TEXAS
Districts 7-C and 8
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Andrews	568	1	44	4,087,380
Borden	111	0	7	917,190
Cochran	50	1	1	262,880
Coke	17	0	3	110,904
Crane	489	5	46	2,261,865
Crockett	98	1	25	369,026
Crosby	12	0	0	46,928
Culberson	11	0	2	31,317
Dawson	62	0	11	485,146
Ector	479	3	22	2,942,352
Gaines	155	2	26	1,367,339
Garza	128	0	16	473,137
Glasscock	21	0	1	163,719
Hockley	24	0	8	187,998
Howard	252	0	22	776,536
Irion	49	1	15	161,078
Kent	11	0	0	70,947
King	12	0	7	51,236
Lamb	25	0	5	124,517
Loving	43	0	6	236,192
Lubbock	28	0	6	166,672
Lynn	15	0	1	70,286
Martin	1	0	1	17,632
McCulloch	3	0	2	9,360
Midland	111	0	5	1,055,099
Mitchell	165	0	7	388,927
Motley	5	0	2	29,961
Pecos	193	7	34	555,307
Reagan	101	0	6	653,157
Reeves	36	6	16	211,034
Runnels	97	2	30	527,687
Schleicher	11	3	5	83,180
Scurry	271	0	25	966,287
Sterling	15	0	7	61,106
Sutton	0	8	2	56,598
Terry	23	0	3	176,826
Tom Green	46	0	16	173,694
Upton	253	1	11	1,618,610
Ward	265	0	41	908,640
Winkler	281	5	32	1,328,880
Yoakum	92	0	6	606,645
Total	4,629	46	525	24,793,275

TEXAS
Districts 7-C and 8
Development Completions by Counties

	Oil	Gas	Dry	Footage
Andrews	6	0	23	243,661
Bailey	0	0	6	26,756
Borden	3	0	9	91,717
Brewster	0	0	1	2,263
Cochran	1	0	8	54,755
Coke	3	0	18	123,416
Concho	0	0	12	41,550
Cottle	0	0	2	12,028
Crane	7	1	44	213,578
Crockett	3	0	38	124,209
Crosby	0	0	6	38,738
Culberson	0	0	8	17,604
Dawson	3	0	13	177,943
Dickens	1	0	3	25,189
Ector	1	0	17	147,171
Floyd	0	0	1	6,061
Gaines	6	0	29	293,775
Garza	7	0	21	147,770
Glasscock	1	0	6	39,256
Hale	0	0	1	356
Hockley	2	0	12	114,655
Howard	5	0	13	98,471
Irion	4	0	33	149,159
Jeff Davis	0	0	1	3,050
Kent	2	0	19	142,306
Kimble	0	1	1	3,028
King	2	0	30	123,135
Lamb	1	0	19	88,129
Loving	1	0	15	71,536
Lubbock	1	0	7	48,153
Lynn	0	0	11	50,884
Martin	1	0	2	28,087
Menard	0	0	2	8,730
McCulloch	1	0	8	15,023
Midland	1	0	3	40,511
Mitchell	0	0	8	35,976
Motley	1	0	3	23,873
Pecos	9	3	43	293,362
Reagan	4	0	14	88,783
Reeves	4	1	13	74,438
Runnels	13	2	51	257,102
Schleicher	4	1	19	105,654
Scurry	3	0	16	109,764
Sterling	0	0	14	60,994
Sutton	0	2	7	46,909
Terrell	0	0	1	7,517
Terry	2	0	8	102,960
Tom Green	3	0	49	254,147
Upton	3	0	11	104,087
Ward	5	1	10	82,400
Winkler	3	0	16	136,166
Yoakum	5	0	13	158,615
Total	122	12	738	4,755,400

TEXAS
District 9
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Archer	221	0	173	838,544
Baylor	247	1	122	584,694
Clay	160	0	57	768,266
Cooke	134	2	52	530,053
Denton	2	0	1	5,310
Foard	24	0	5	174,177
Grayson	24	0	15	252,889
Jack	75	15	35	413,160
Knox	248	0	124	749,103
Montague	114	0	38	468,221
Wichita	492	0	197	1,439,940
Wilbarger	186	0	93	731,968
Wise	136	49	36	1,163,371
Young	233	1	155	974,795
Total	2,431	81	2,044	12,432,809

TEXAS
District 9
Development Completions by Counties

	Oil	Gas	Dry	Footage
Archer	17	0	69	266,441
Baylor	5	0	141	295,923
Clay	6	0	31	169,107
Cooke	12	0	42	178,347
Denton	1	0	7	21,115
Foard	0	0	19	65,298
Grayson	1	0	20	123,055
Hardeman	0	0	2	12,482
Jack	9	1	51	224,205
Knox	31	0	270	703,937
Montague	7	0	34	232,842
Wichita	2	0	21	71,268
Wilbarger	2	0	91	254,904
Wise	10	12	16	220,598
Young	32	0	127	498,796
Total	135	13	941	3,338,318

TEXAS
District 10
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Briscoe	0	0	1	6,210
Carson	0	0	2	8,919
Collingsworth	0	0	8	21,330
Dallam	0	2	3	24,025
Deaf Smith	0	0	1	8,372
Donley	0	0	3	12,865
Hansford	3	1	12	104,091
Hartley	0	0	7	43,859
Hemphill	2	0	2	53,769
Hutchinson	1	0	7	49,067
Lipscomb	3	1	8	113,552
Moore	1	0	1	7,512
Ochiltree	6	0	12	149,230
Oldham	1	0	0	6,722
Potter	0	0	7	22,494
Randall	0	0	2	15,728
Roberts	2	0	9	97,165
Sherman	0	0	3	11,046
Swisher	0	0	1	7,661
Wheeler	0	0	1	2,085
Total	*19	4	90	765,702

*Includes condensate wells.

TEXAS
District 10
Development Completions by Counties

	Oil	Gas	Dry	Footage
Carson	105	10	6	396,304
Collingsworth	0	56	14	132,062
Dallam	1	3	0	14,511
Donley	0	1	4	9,916
Gray	206	58	12	811,895
Hansford	60	19	13	646,395
Hartley	0	0	1	3,630
Hemphill	3	2	0	39,045
Hutchinson	402	15	7	1,302,059
Lipscomb	9	4	6	184,511
Moore	16	18	6	141,349
Ochiltree	54	8	13	607,900
Oldham	2	0	1	31,024
Potter	0	8	2	30,123
Roberts	27	13	2	269,704
Sherman	0	11	1	41,979
Wheeler	66	16	13	210,682
Total	*951	242	†101	4,873,089

*Includes condensate wells. †Includes service wells.

UTAH
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Box Elder	0	0	2	1,193
Cache	0	0	2	10,710
Duchesne	0	0	1	2,100
Emery	0	1	7	33,642
Garfield	0	0	2	17,463
Grand	1	3	13	65,705
Kane	0	0	1	6,253
Millard	0	0	1	8,061
Salt Lake	0	0	1	4,231
San Juan	10	1	55	375,124
Sevier	0	0	3	10,958
Summit	0	0	1	3,700
Tooele	0	0	1	7,992
Uintah	1	2	8	49,756
Utah	0	0	1	7,768
Wayne	0	0	3	12,322
Total	12	7	102	616,978

UTAH
Development Completions by Counties

	Oil	Gas	Dry	Footage
Carbon	0	1	0	12,293
Emery	0	1	1	3,687
Grand	1	2	2	14,291
San Juan	108	0	14	703,361
San Pete	0	0	1	4,970
Uintah	12	1	2	92,373
Total	121	5	20	830,975

WEST VIRGINIA
Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Greenbrier	0	0	1	4,667
Hampshire	0	0	1	5,859
Jackson	0	0	1	4,714
Kanawha	0	0	1	6,272
Logan	0	0	1	5,704
Mercer	0	2	0	3,963
Monongalia	0	0	1	7,391
Monroe	0	0	1	3,422
Pendleton	0	0	1	7,211
Pocahontas	0	1	1	10,758
Preston	0	1	0	4,984
Randolph	0	8	2	58,387
Tucker	0	5	1	29,715
Tyler	0	0	1	6,501
Webster	0	0	2	8,597
Wood	0	0	1	5,102
Total	0	17	16	173,247

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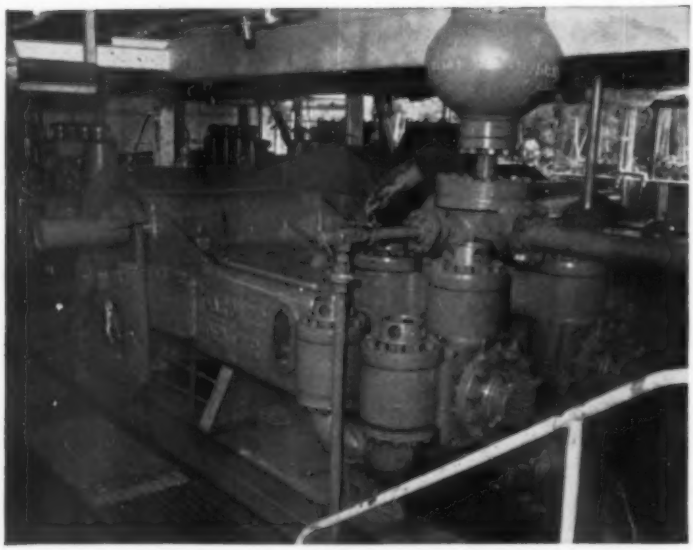

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GXP 625 hp.	GXN 500 hp.
GXQ 350 hp.	FK-FXK 255 hp.
FZ-FXZ 185 hp.	FO-FXO 122 hp.

Quality mud pump parts.

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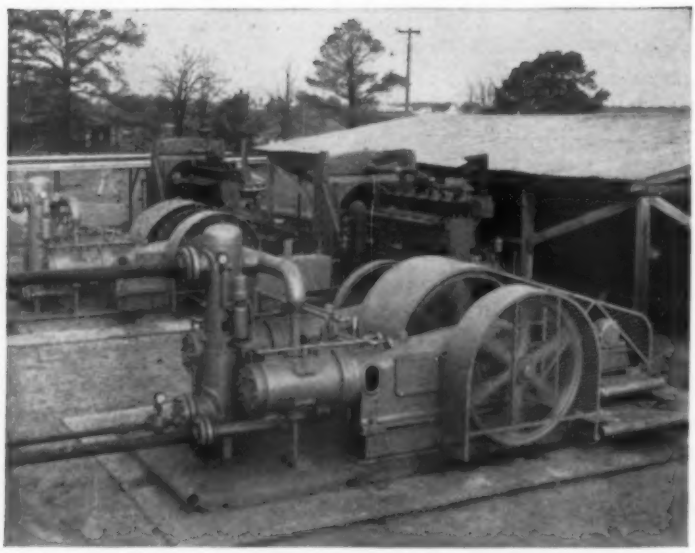
GX mud pumps for offshore drilling rigs. Eccentric construction keeps bearing pressures low. Counterbalanced crankshaft.



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*Trade-Mark

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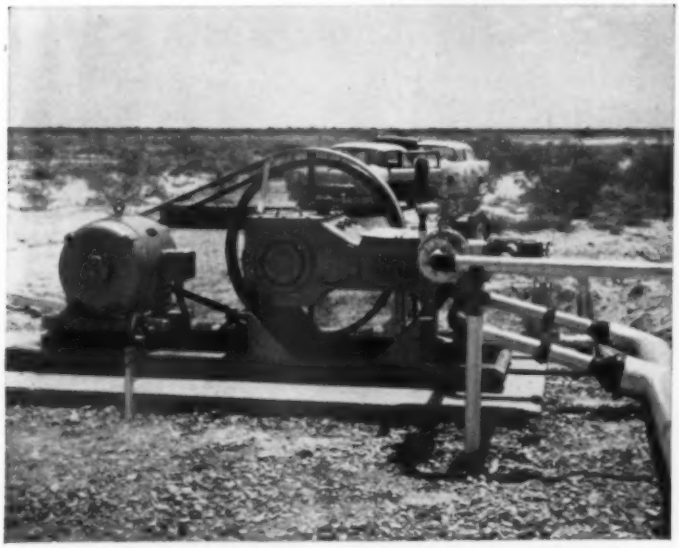

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The most complete line of quality power pumps for waterflood and salt water disposal:

PL-7 six-cylinder plunger—240 hp.

PA-8 triplex plunger—160 hp.

PE-5 triplex plunger—75 hp.

PG-3 triplex plunger—30 hp.

FG-FXG duplex piston—60 hp.

FF-FXF duplex piston—40 hp.

LE-LXE duplex piston—24 hp.

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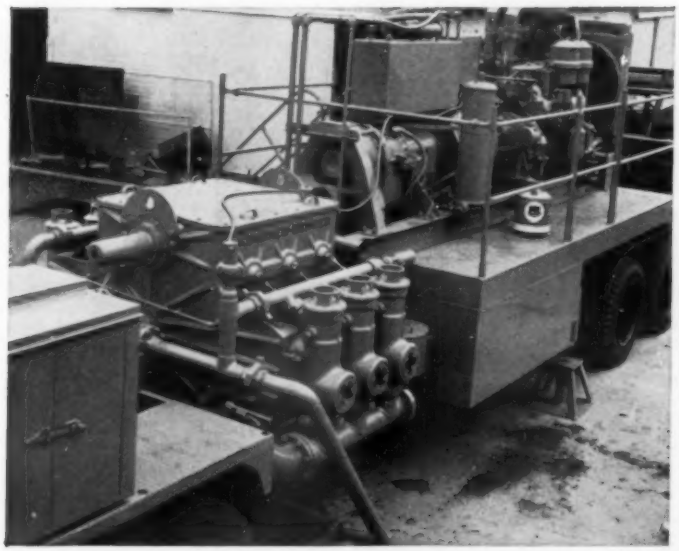

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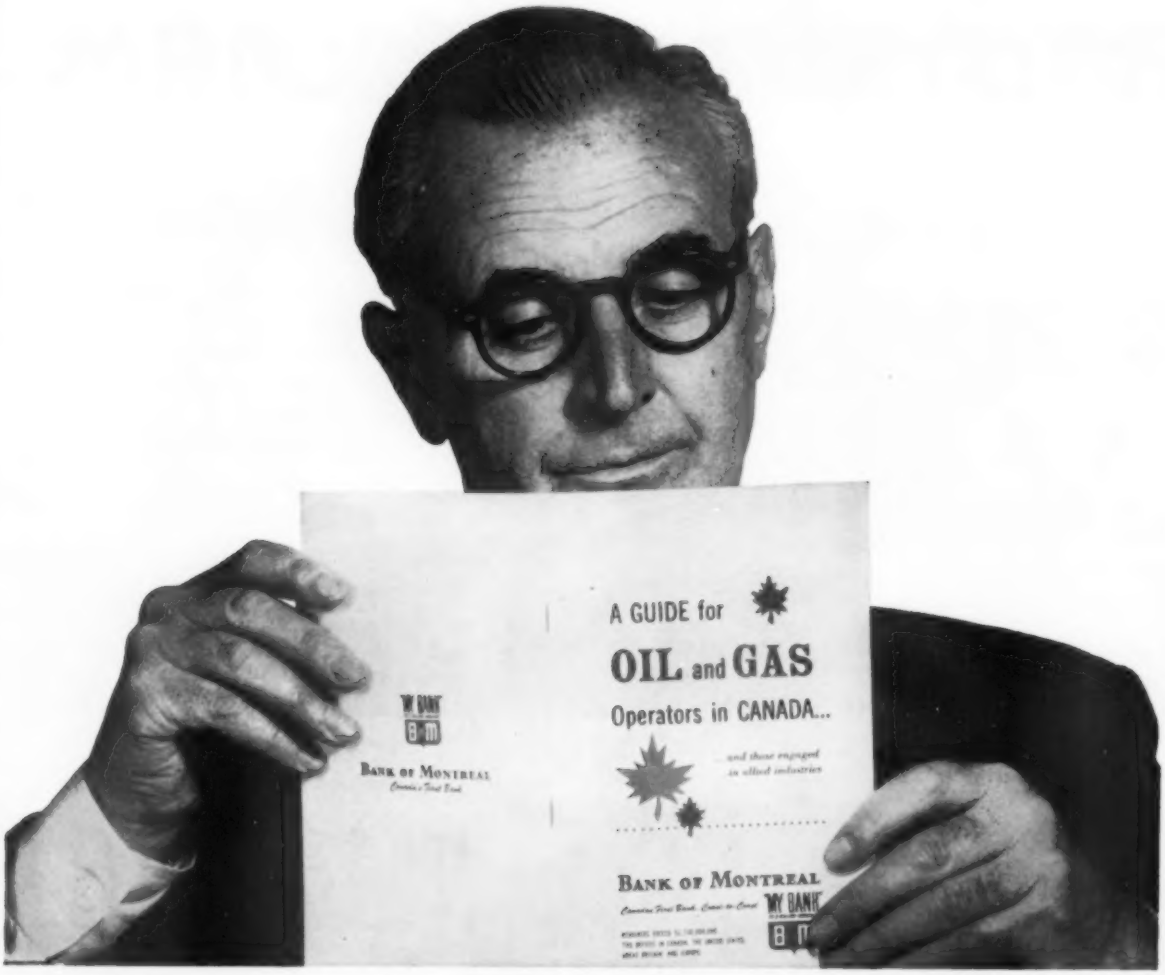

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1957 Wildcat and field drilling

WEST VIRGINIA

Development Completions by Counties

	Oil	Gas	Dry	Footage
Barbour	0	3	0	10,263
Boone	0	2	1	12,450
Braxton	0	5	0	7,476
Calhoun	26	43	6	134,716
Clay	0	3	0	6,162
Doddridge	0	6	4	23,618
Fayette	0	1	2	7,961
Gilmer	1	18	4	44,200
Hancock	1	0	0	1,291
Jackson	8	4	10	47,217
Kanawha	3	5	1	24,828
Lewis	5	5	2	21,891
Lincoln	1	38	1	139,536
Logan	1	81	7	269,710
McDowell	0	10	0	45,122
Marshall	0	0	1	3,500
Mercer	0	1	1	4,478
Mingo	0	45	14	192,255
Monongalia	1	1	0	5,429
Nicholas	0	11	0	23,350
Pleasants	6	7	2	24,547
Preston	0	0	1	6,197
Putnam	0	20	4	91,449
Raleigh	0	7	2	29,021
Ritchie	16	48	16	163,176
Roane	5	3	2	20,152
Taylor	0	0	1	2,234
Tyler	0	5	4	17,897
Upshur	0	25	1	109,994
Wayne	3	23	3	74,882
Webster	0	1	0	3,542
Wetzel	1	8	3	9,501
Wirt	4	0	7	15,501
Wood	6	0	6	25,992
Wyoming	0	20	4	78,012
Total	88	442	110	1,697,550

WYOMING

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Albany	0	0	3	10,346
Big Horn	5	0	14	67,751
Campbell	4	0	30	259,992
Carbon	2	0	16	110,112
Converse	1	0	15	95,372
Crook	5	0	22	82,809
Fremont	3	4	25	118,201
Goshen	0	0	4	29,873
Hot Springs	1	0	10	39,475
Johnson	0	0	12	59,616
Laramie	2	0	11	94,867
Lincoln	0	1	6	40,962
Natrona	4	0	38	151,333
Niobrara	1	1	12	44,762
Park	1	0	3	30,729
Platte	0	0	6	27,943
Sheridan	0	0	3	9,764
Sublette	2	3	2	53,036
Sweetwater	0	1	12	93,633
Teton	0	0	2	15,410
Washakie	0	0	10	72,396
Weston	2	0	11	51,939
Total	*33	10	267	1,570,321

*Includes condensate wells.

WYOMING

Development Completions by Counties

	Oil	Gas	Dry	Footage
Big Horn	8	0	19	89,222
Campbell	19	0	2	148,797
Carbon	2	0	3	33,007
Converse	16	0	22	130,184
Crook	23	0	24	171,207
Fremont	27	2	6	129,014
Hot Springs	31	0	4	122,418
Johnson	30	0	16	244,442
Laramie	1	0	3	29,828
Lincoln	0	0	1	8,699
Natrona	80	1	22	296,195
Niobrara	8	0	7	36,463
Park	5	0	5	54,759
Sheridan	1	0	0	4,580
Sublette	5	32	7	227,088
Sweetwater	3	1	1	36,205
Washakie	28	0	9	283,549
Weston	41	0	38	231,631
Total	328	36	†189	2,277,288

†Includes service wells.

SOUTHEAST NEW MEXICO

Wildcat Completions by Counties

	Oil	Gas	Dry	Footage
Chaves	0	2	16	62,375
De Baca	0	0	2	3,829
Eddy	6	1	45	161,397
Lea	26	1	56	643,353
Roosevelt	1	0	6	49,765
San Miguel	0	0	1	4,325
Union	0	0	2	7,863
Total	33	4	128	932,907

SOUTHEAST NEW MEXICO

Development Completions by Counties

	Oil	Gas	Dry	Footage
Chaves	38	0	15	140,156
Eddy	250	3	54	838,632
Lea	570	26	82	4,111,276
Roosevelt	5	0	1	55,800
Total	863	29	152	5,145,864

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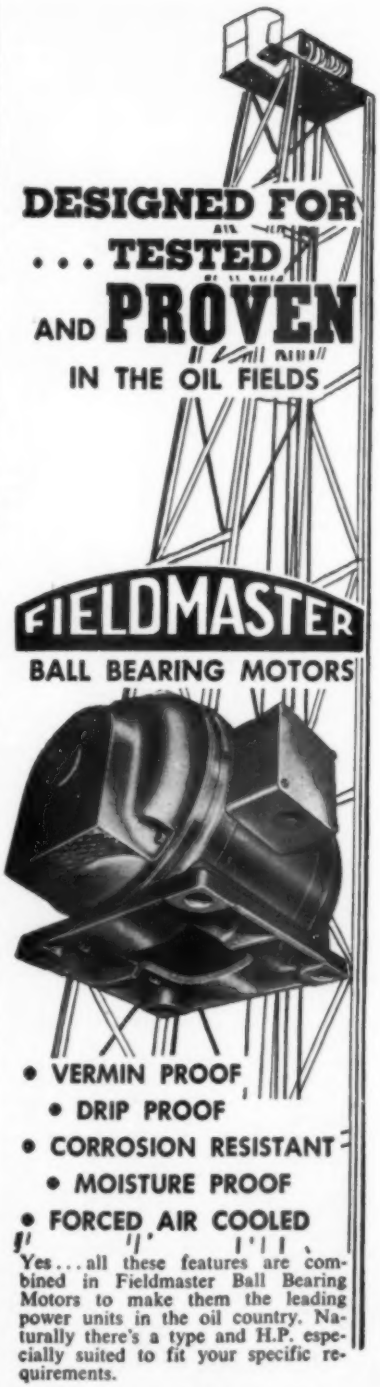

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By W. L. Nelson, Technical Editor

COSTimating

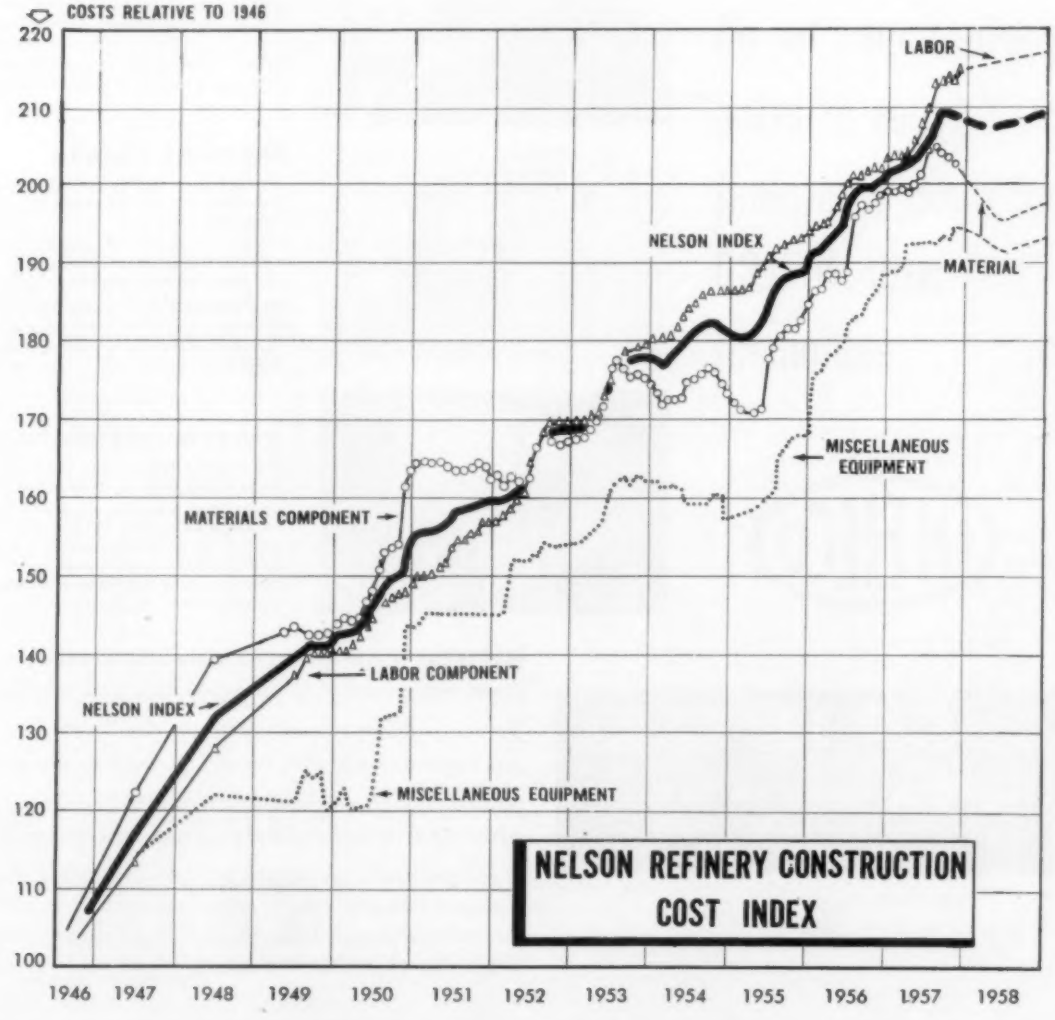
Is Rise in Cost of Refinery Construction Halted?

BARRING such emergencies as wars or a curtailment of business of a magnitude far greater than anything yet voiced, 1958 will end with refinery-construction costs at about the same level as during recent months. Decreases in the costs of materials will almost balance the expected increases in labor costs.

Since 1946, labor increases have never faltered and although the cost of materials decreased in early 1951 and again in mid-1953 and 1954, the cost of refinery construction only once decreased in a definite way, namely, late 1954. A similar decrease appears to be in the making now (decreases in October and November) but some firmness was indicated by preliminary December 1957 figures.

The Korean War during 1950 caused the first sharp increase in material costs but later sharp increases have been precipitated by wage increases. It will be noted that wage increases during June-August 1952 preceded the general cost rise and likewise during May-August 1953. Steel workers' wages are not used directly in the Nelson Index, but the effect of increases of steel workers' wages is clearly evident in the cost of materials during June-August of 1953, 1954, 1955, and 1956.

Manufacturers of equipment and machinery (pumps, compressors, engines, instruments, heat exchangers, and electrical equipment) seem to have been able to overcome higher labor and raw-materials cost by improved management and design.



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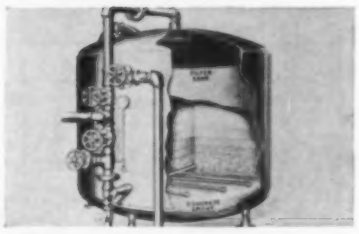

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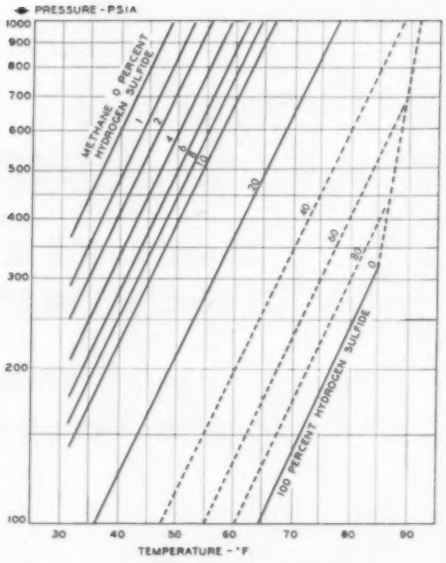
This is the way to

Whip Hydrate Formation

in refinery facilities

The production and processing of sour gas and liquids in Wyoming presented a challenge to the oil and gas industry, but were taken in stride. Experience is invaluable in the development of this relatively new phase of the industry.

By R. S. Birmingham



HYDRATE FORMATION conditions for hydrogen sulfide-methane mixtures. Fig. 1.

BECAUSE of a high concentration of hydrogen sulfide and water in the gas and oil produced in certain areas, hydrates form in flow lines, gathering lines, and process facilities at higher temperatures than those experienced in handling comparatively sweet production.

Hot-oil-circulating strings are sometimes used to prevent well and flow-line hydrates. A pipe is set between the well casing and tubing down to the point where hydrates are not encountered, usually 3,000 to 3,500 ft. Hot oil is pumped in between the tubing and the circulating pipe, the well-annulus space fills with oil and oil rises up between the circulating pipe and casing to a surge tank.

Circulating oil is pumped from the surge tank to a heater and back down the well between the tubing and the circulating pipe. The production stream is thus kept warm and above the hydrate point.

Line heaters, methanol injection, and wellhead dehydration are used to prevent hydrate formation in the gathering line.

When handling gas containing 60 per cent hydrogen sulfide, hydrate formation has been experienced at 65° F. in lines and coolers operating at 130 psig.

Hydrates would not be expected to form at this temperature in sweet-gas systems unless a pressure of 800 psig. or more existed.

Fig. 1 shows graphically the pressure-temperature relations for hydrate formation in a three-component system of hydrogen sulfide, methane, and water.[1]

Steam tracing and insulation are used to prevent hydrate formation in plants where conditions conducive to their formation occur.

Sour Gas Presents Safety Problems

Hydrogen sulfide falls in the poison-gas class of hydrogen cyanide used in lethal-gas chambers.

Besides being toxic, hydrogen sulfide has a broad flammability limit, being four times as broad as methane which has the broadest flammability limit in the saturated-hydrocarbons series.

This ever-present hazard is recognized and precautionary measures are observed. Practices which are more or less uniform in the Wyoming area are:

1. Gas blankets are maintained on field storage tanks to prevent ignition due to presence of iron sulfide.

2. Overpressure valves are discharged to a waste-gas flare where a constant pilot light is maintained.

3. All sour vessels opened for inspection are thoroughly steamed to prevent flashing due to iron sulfide ignition. Corrosion products are kept wet and are immediately removed from the area as they may ignite.

4. All facilities are regularly inspected for leaks and corrosion and programs of preventive maintenance installed.

5. All employes are thoroughly schooled in the use of preventive respiratory and resuscitator equipment.

Author is with Pure Oil Co., Worland, Wyo. Paper presented at Rocky Mountain regional meeting, Natural Gasoline Association of America, 1957.

Acknowledgment

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Reference

1. Noaker, Leslie, J.; Katz, Donald L., "Gas Hydrates of Hydrogen Sulfide-Methane Mixtures," Jour. of Pet. Tech., September 1954.

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Drilling Contractors

Ballard Drilling Co. has a rig working for Austral Oil Exploration Co. in the Lake Arthur area, Jefferson Davis Parish, South Louisiana. Current operation is at 1 La Cour-Hughes Unit, in 34-10s-3w. Permit depth is 13,500 ft.

Stewart & Granger Drilling Co., Houston, has the contract on the projected 15,000-ft. test Union Oil Co. of California is undertaking in the coastal marsh area of Vermilion Parish, Louisiana. Union's location is about 4 miles north of Fresh Water Bayou field, in 4-16s-2e. Location is listed as 1-F Louisiana Furs.

Graham, Inc., Houston, will drill Michel T. Halbouty's deep wildcat test in the Bell City area, southeast of Lake Charles, in the southeastern corner of Calcasieu Parish, southwestern Louisiana. Halbouty's permit is for a 15,000-ft. test. Location is at 1 Sweet Lake Land & Oil Co., in 4-11s-6w. It is about midway between East Bell City and South Bell City fields.

Tucker Drilling Co., San Angelo, Tex., is associated with Dan and Jack Aud in an Ellenburger wildcat venture in southwestern Kerr County, in the Edwards Plateau "hill" country of Texas. Location is on their Hilda Auld land, in Section 1591, CCSD&-RGNG Survey. It is about 20 miles southwest of Hunt, and about 40 miles southwest of Kerrville. Tucker is doing the drilling.

Miller & York, Bakersfield, Calif., will drill Ohio Oil Co.'s newly reported wildcat test 6 miles southeast of Riverdale field, in Fresno County, Central California. The rig is coming from a well the contractors have been drilling for Patrick A. Doheny at Helm, Calif. Ohio's test is at 1 Toste, in 10-18-20. It will be drilled through the Miocene and Eocene sands productilve in Riverdale field below 6,600 ft.

Peterson Drilling Co., Shreveport, has a new contract operation under way south of Harrisonburg, in Catahoula Parish, East-Central Louisiana. It is a 5,300-ft. Wilcox test for Marlin Exploration, Inc., also of Shreveport. Location is about 2 miles north of Tew Lake field, nearest production.

Gilger Drilling Co., Houston, has the contract on Austral Oil Exploration Co.'s new deep test in the recently opened East Chenier gas area in southern Cameron Parish, Louisiana Gulf Coast. The new operation, 1 North American, in 17-14s-6w, is an

TOUR CHANGE on a deep-drilling rig Shoreline Drilling Co., New Orleans, has been running on contract for Southern Natural Gas Co. in the Plumb Bob area of St. Martin Parish, coastal Louisiana. Top row, left to right: W. K. Morphis, tool pusher; D. J. Ownes, driller; C. J. Breaux, derrickman; A. V. Ownes, engineman; H. J. Guidry and J. W. Foreman, floormen; Russell Dupuis, mechanic. Bottom row, daylight crew, left to right: H. A. Griffin, driller; R. W. Coleman, derrickman; B. L. Wellborn, engineman; F. D. Reno and B. J. Landos, floormen.

there's a Hercules tubing head

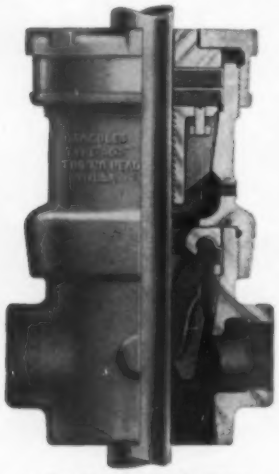
TO FIT YOUR REQUIREMENTS...

HERCULES "Type SO" Tubing Head is particularly suited for pumping due to compactness (only 12½" high). Stripper rubber can be used in body for running or wiping tubing. Also ideal for intermittently flowing wells.

"TYPE SO" TUBING HEAD

HERCULES "Type SO" and "SOS" Tubing Heads are the favorite of successful operators because of their simplicity, ruggedness and ease of operation. Available in 4½" OD to 7" OD Casing Sizes to suspend 2", 2½" or 3" tubing. Constructed from pressure cast steel and tested to 4,000 PSI. Slips are hinged for ease of installation and positive alignment.

HERCULES "Type SOS" Stripper Tubing Head is unsurpassed for use in well servicing operations as well as on flowing wells. It consists of a HERCULES "Type SO" Tubing Head with a bowl and Neoprene Tubing Stripper.



"TYPE SOS" TUBING HEAD

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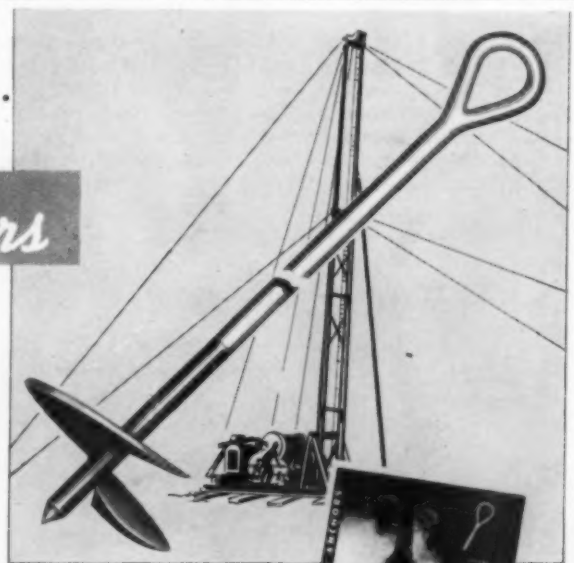

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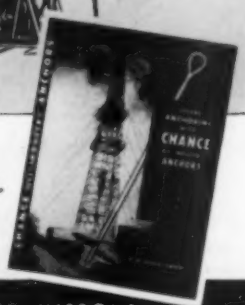

A·B·CHANCE CO. CENTRALIA, MISSOURI TORONTO, ONTARIO, CANADA

east offset to Austral's discovery well, completed last October in a 10,340-ft. sand. Its permit is for 11,500 ft.

Rex Drilling Co., Shreveport, has put a rig to work in the newly opened oil-productive area 8 miles northeast of Henderson, in Rusk County, East Texas. It is drilling on contract for Jones-O'Brien, Inc., of Shreveport, whose first location is about ¾ mile northwest of the Pettet discovery well, drilled by Peyton McKnight, Jr., and others. Production is in a 7,175-ft. zone. Jones-O'Brien's permit is for 7,800 ft.

Doc Drilling Co., Franklin, La., has contracted for a 15,000-ft. test to be drilled for Olin Gas Transmission Co. on the south side of Coffee Bay field, in Lafourche Parish, southeastern Louisiana. Its location is at 1-D Grandison Unit, in 15-19s-23e.

Buster-Gardner Drilling Co., Franklin, La., has a new bay drilling job in St. Mary Parish, South Louisiana. It is a 11,000-ft. wildcat test for Sunray Mid-Continent Oil Co. off the east flank of Lake Sand field, in East Cote Blanche Bay. Location is on State Lease 3132.

George Graham, Inc., Houston, has taken on two more deep contract jobs in South Louisiana. One is a 13,300-ft. wildcat test for Arkansas Fuel Oil Co. in Iberville Parish. It is at 2 Wilbert, in 40-8s-9e, about 4½ miles east of Bayou Des Glaise field. The other is a 10,500-ft. well for Cheyenne Oil Co. and M. E. Andrews at 1 Freeland, in the Grand Coulee area, Acadia Parish.

Webster Drilling Co., Houston, will drill a 13,500-ft. test for Quintana Petroleum Corp., also of Houston, at a wildcat location 6 miles west of New Iberia field, in Iberia Parish, South Louisiana. Its location is at 1 Decuir et al, in 22-12s-6e. It also is about 7 miles northeast of Avery Island field.

Rimrock Tidelands, Inc., New Orleans, is putting a rig to work for California Co. in the Raleigh area of Smith County, southern Mississippi. Its contract is for California Co.'s 5-3 Central, an outpost test about 1 mile north of the field's nearest well. Plans call for a 13,000-ft. test. **Marshall R. Young,** Fort Worth, and **Dixilyn Drilling Co.,** Odessa, Tex., have been drilling for California Co. at Raleigh. Each has a rig there. The field, discovered a year ago, now has four wells with production from 12,000-ft. Lower Cretaceous sands.

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If mud gets to your joint threads, it can wash out a string in a hurry. 'Bestolife Lead Seal Tool Joint and Casing Compound gives maximum, *tight* joint make-up, keeps mud out. Standard of the oil country for over twenty-five years. Unconditionally guaranteed. Packed in 1¼, 5, 20 and 50 lb. containers. Sold by leading supply houses throughout the world.

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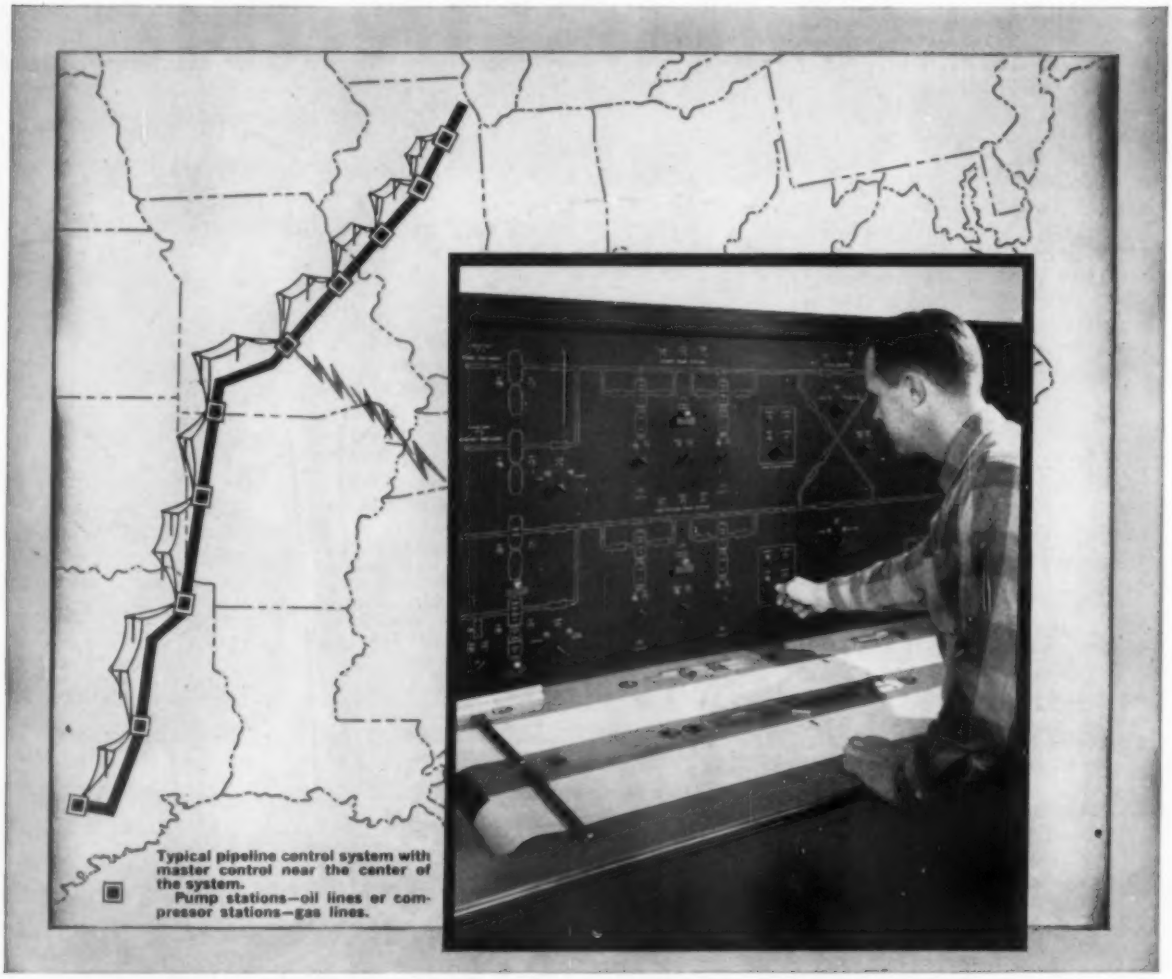

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Chromium-treating process promises

Longer piston life for power pumps

BIG SAVINGS are possible by replacing stainless-steel pistons with specially treated carbon-steel pistons in vertical power pumps used in abrasive and corrosive applications, reports Chromalloy Corp., White Plains, N.Y.

The chromium-treated carbon-steel pump piston shown at right in photograph has been in service more than 4,000 hours. The 420 stainless-steel piston at left has been heavily scored by abrasive sand after 650 hours and had to be removed for regrinding or replacement. The Chromalloy piston was unaffected during this period.

The company reports that carbon-steel pistons treated by its chromium-diffusion process have replaced 420 stainless-steel pistons at a saving of more than 50 per cent.

Here's how the Chromalloy process works: A high-temperature exchange of iron and chromium atoms at the surface of the piston provides it with a chromium-carbide outer layer that is integral with the base metal. The surface hardness is said to be higher than can be created by any conventional hardening method. Corrosion resistance is equivalent to the 400 series stainless.

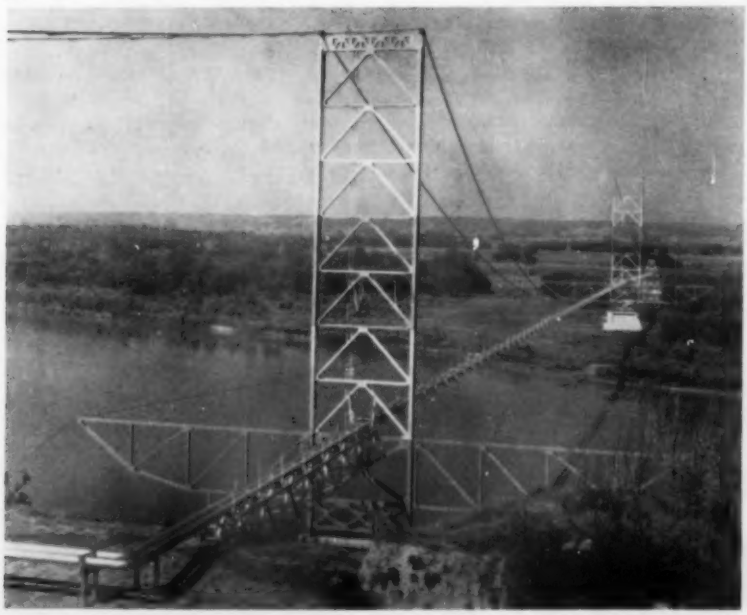
WEAR on the stainless-steel piston at left is more noticeable than on the chromium-treated piston at right.

A typical application reported by the company involved a power pump generating water pressure up to 2,200 psi. in a cleaning operation. Piston abrasion caused leakage, limited pump life to about 600 hours. The pistons were made of 420 stainless and cost $42.50 each. They could be reground twice, but this cost money in pump down time and labor. New packing, at $7.30, was needed each time a piston was reground. This raised the total cost to $105 for each piston.

Chromium-treated carbon-steel pistons proved less expensive and three times as durable. They brought these economies: negligible maintenance, no need to tighten or replace packing, and piston service life of over 4,000 hours.

This bridge design took top honors

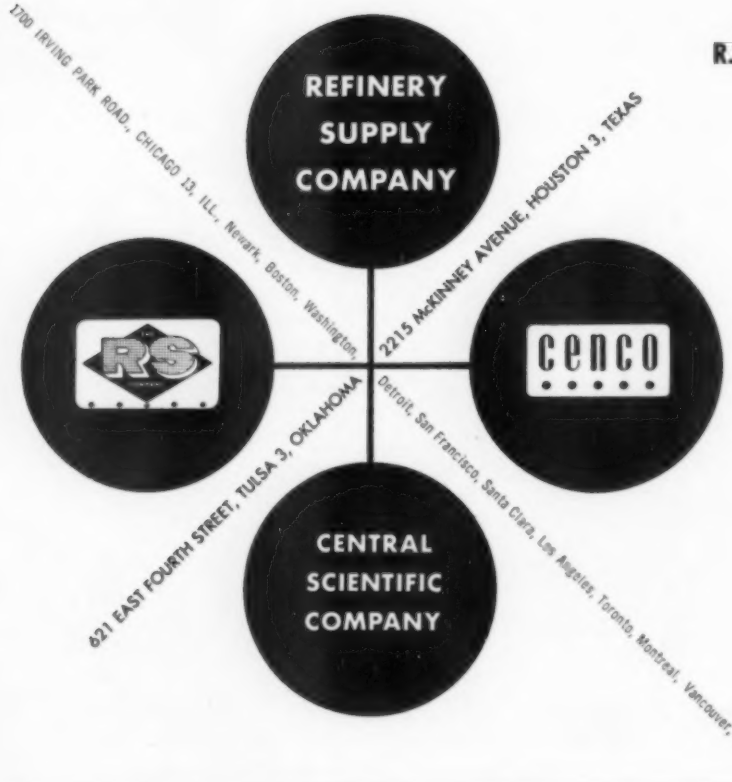
. . . in AISC design competition



THIS BRIDGE over the Missouri River was picked by the AISC as the year's best-looking big bridge.

THE MISSOURI RIVER pipeline suspension bridge at Plattsmouth, Nebr. has been picked by the American Institute of Steel Construction as the year's best-looking big bridge. Built by Pittsburgh-Des Moines Steel Co., including foundations, the prize-winning structure has a main span of 1,500 ft., side span of 750 ft., and back-stay spans of 688 and 435 ft., respectively.

Pittsburgh-Des Moines was named winner in Class 1 for bridges of 400-ft. span or over, in the AISC's 29th annual aesthetic-bridge competition. Owner of the bridge is Northern Natural Gas Co. Designers were Matthews and Kenan, San Antonio.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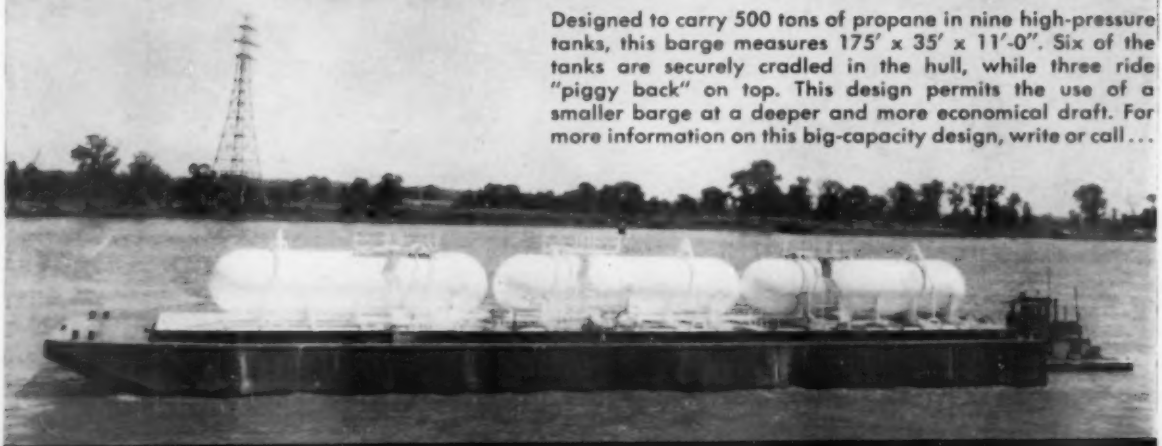
- **Gas pressures on pipe line leakage tests**

This instrument is based on the principle of generation of pressure by application of a known weight to a hydraulic piston on known area. Conversely, an unknown pressure can be measured by balancing its force on a piston of known area with a known weight—the result is extremely accurate pressure readings.

Propane Barges with "Piggy Back" Tanks Carry MORE in LESS Space!

Designed to carry 500 tons of propane in nine high-pressure tanks, this barge measures 175' x 35' x 11'-0". Six of the tanks are securely cradled in the hull, while three ride "piggy back" on top. This design permits the use of a smaller barge at a deeper and more economical draft. For more information on this big-capacity design, write or call...



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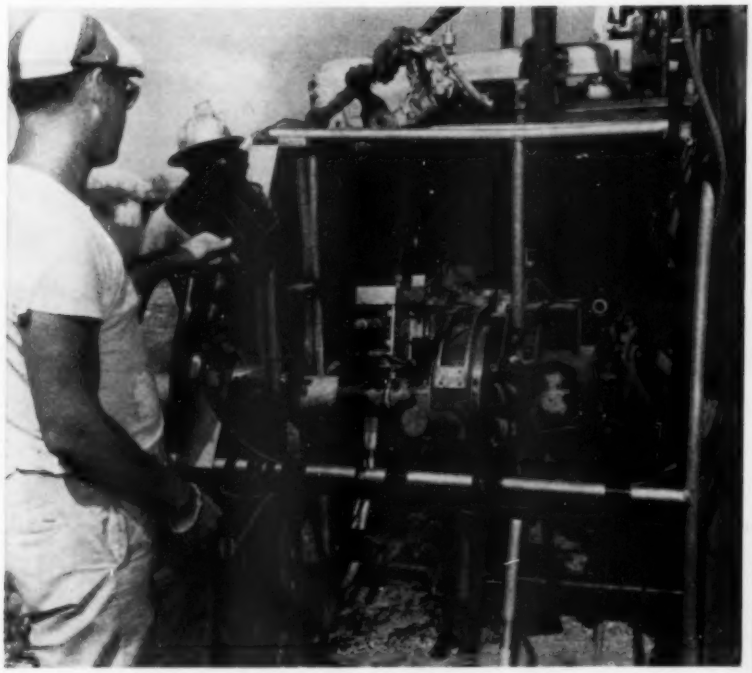

This machine does a practical job of . . .

Welding Aluminum Pipe

AN AUTOMATIC MACHINE for welding aluminum pipe is operating on a pipe-laying barge of Creole Petroleum Corp. at Lake Maracaibo, Venezuela. The project is the first full-scale installation of underwater aluminum flow lines. Pipe diameters are 4 and 8 in.

For this undertaking aluminum pipe is being supplied by Reynolds Metal Co. and Aluminum Co. of America. Each company procured a welding machine from Air Reduction Sales Co. for its part of the project.

The machine in the photograph is the Reynolds' unit, modified by the addition of two features: (1) Provision for oscillating the welding tip; (2) programing for changing speeds while the tip moves around the pipe. This machine is being used for welding the 17,000 ft. of 8.625-in. Schedule 40 aluminum pipe furnished by Reynolds as part of the Creole aluminum-pipe project.

The Alcoa machine is used without modifications.

The design of the Airco machine is basically the same as for the one used in 1954 for welding the 10-mile, 8-in. aluminum pipeline between White Point, Tex., and the Reynolds plant. Operation is 100 per cent mechanized. There is no supplementary manual welding; the improved machine is reported to weld better and more consistently. It is faster and more rugged.

The rotating part of the unit turns around the pipe, carrying an electric arc, shielded by inert gas. The process and equipment are entirely satisfactory for aluminum pipe which is easier to weld than steel pipe. The problems of welding steel pipe by this procedure have not yet been solved.

At final field test near Corpus Christi, Tex., conducted this year just before the welding machine was shipped for Reynolds to Venezuela, a total of 4 miles of 4-in. aluminum pipe was welded. In a 4-hour period, 2,880 ft. was welded—18 welds per hour, 3⅓ minutes per weld.

Free-Swinging Gate Is Easily Put Together

SOME old angle iron and a welding and cutting outfit are all you need to make a frame that allows your gate to swing freely in and out. The size of your frame will depend upon the gate size, and once you install a frame, you'll have no trouble with half-opened gates. Pin type of hinges between the gate and the frame will eliminate the problem of retracing steps to open your gate.

Reprinted from Linde Tips, Vol. 34.

KNOCK OUT RUST WITH THIS 1-2 PUNCH!

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2. **Finish** with one of General's specialized industrial coatings.

RUSTMASTER SYSTEM

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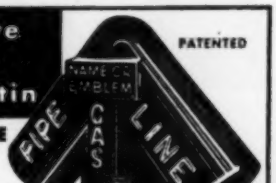

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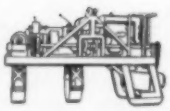
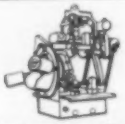
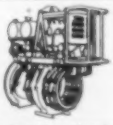
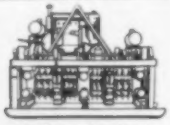

road boring machine

Cinch hydraulic pipe bending machine


line traveling coating & wrapping machine


line traveling cleaning & priming machine

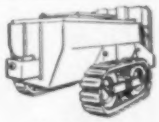
pipeline cradles

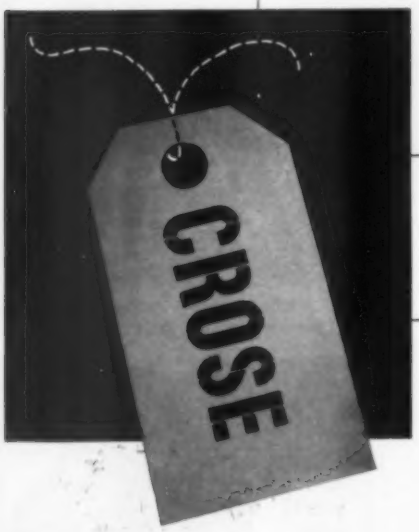

stationary cleaning & priming machine

pipe cutting & beveling machine

internal line up clamp

ditch padder


pipeline kettles



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Pipeline Crossing

is a shop-made job

A SIMPLE pipeline crossing—made up mostly in the shop—is used on Mene Grande Oil Co. gas lines in eastern Venezuela. It consists mostly of used drill pipe, drilling line, and four turnbuckles.

The A-frames are cut long enough to be set in concrete and a slot is made on each side of the top to hold the cables in place. After the A-frames are erected, the line is jacked up and placed on a crossmember. Loops are then welded to the top of the pipe to hold the turnbuckles as shown.

The ends of the cables are then fastened to the pipe in the center of the stream and brought back through the slots in the top of the A-frames to the turnbuckles, and tightened enough to hold the pipe above high water.

The cables can be adjusted from time to time by use of the turnbuckles.

Save Your Knuckles With Chisel Handle

NOT everyone can hit a cold chisel on the head every time he aims for it.

Braze weld a short length of ½-in. rod to a point about one-third of the way from the top of your chisel. You'll save your hands from jarring and bruising if you hold the chisel by this handle, and you can use the chisel as a chipping hammer for cleaning slag and scale from your welding jobs. If you want the chisel to stand alone, braze legs to the handle.

Reprinted from Linde Tips, Vol. 34.

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Want to know more about what makes tanks tight? Send for this most unusual handbook of valuable information and specifications. IT'S FREE!

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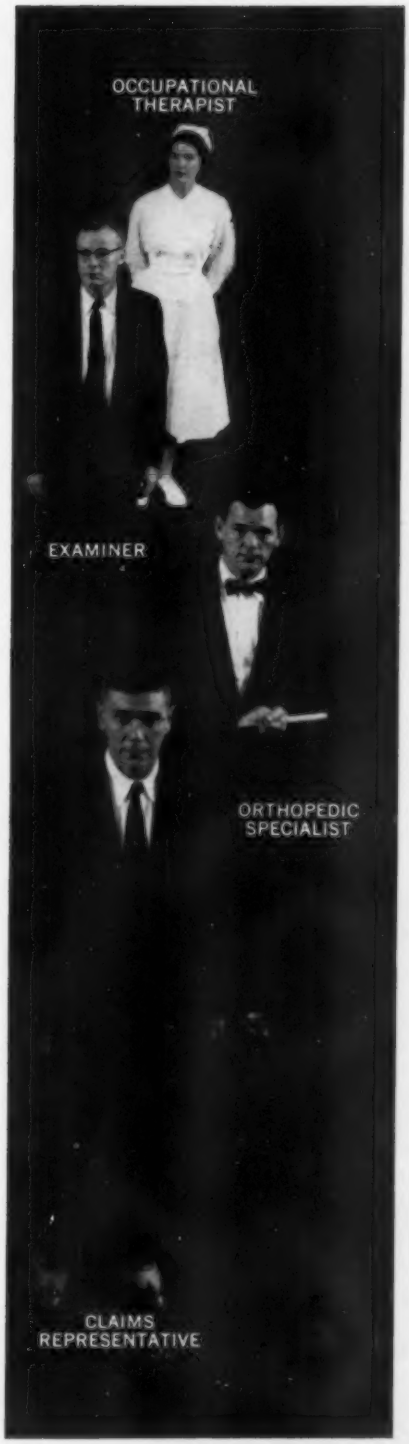

Insurance team saves roughneck's life

MAN RIDDLED WITH BULLETS—LIBERTY MUTUAL'S "UMBRELLA OF CARE" GETS HIM BACK TO WORK

Two years ago a perforating gun exploded in Jim Johnson's hands, riddling him with shrapnel and bullets. When he arrived at the hospital, the doctor said "This is the worst injured man I have ever seen alive." Jim's life hung in the balance for six months of surgery . . . and he was in danger again many times during his stormy convalescence.

Liberty Mutual entered this case the day of the accident. Nurses, consultants, medical and rehabilitation specialists of all kinds were assigned to the case by Liberty. They worked continually with the brilliant attending physicians whose skill pulled Jim through. After leaving the hospital, Jim attended the Liberty Rehabilitation Center in Boston where he was fitted with an artificial limb so ingenious he is able to walk even though one leg is gone and the other seriously handicapped. Today Jim is back at work for the same drilling company.

The Johnson case is closed as far as compensation is concerned. But Liberty medical personnel still check up from time to time to see how Jim is getting along.

The Jim Johnson story shows the kind of protection you get when you insure with Liberty Mutual, world's largest writer of compensation insurance. Competent medical personnel work to keep losses down. In addition, Liberty assigns trained engineers to work with you on the rig — to keep men from getting hurt. Liberty also provides the best of claims service in your area to follow through on all accidents and claims.

Liberty Mutual's protection plan for oil well drillers includes Rig Insurance, Fleet Insurance, Workmen's Compensation and Public Liability. And to top it off — Liberty has a great story on savings to tell you.

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The recently introduced Model "F" Sherman Power Digger excavates faster than any comparable backhoe!

Hard to believe? Well, don't take our word for it. We challenge you to "Clock it"! Ask your Ford Tractor Dealer to demonstrate the new Sherman on *your* job while you time it with a stopwatch. Prove to yourself that it saves you money by producing more work per dollar invested in time, equipment, maintenance and manpower.

If you are interested, we'll be glad to tell you of the many revolutionary features which contribute to the digging speed and durability of the new Model "F". Just drop us a line for Bulletin No. 1570.

Sold and Serviced by your local
FORD TRACTOR DEALER

Sherman

PRODUCTS, INC.
ROYAL OAK, MICHIGAN

POWER DIGGERS • FRONT END LOADERS • FORK LIFTS

C&I

NITRIC ACID PLANTS

available world-wide

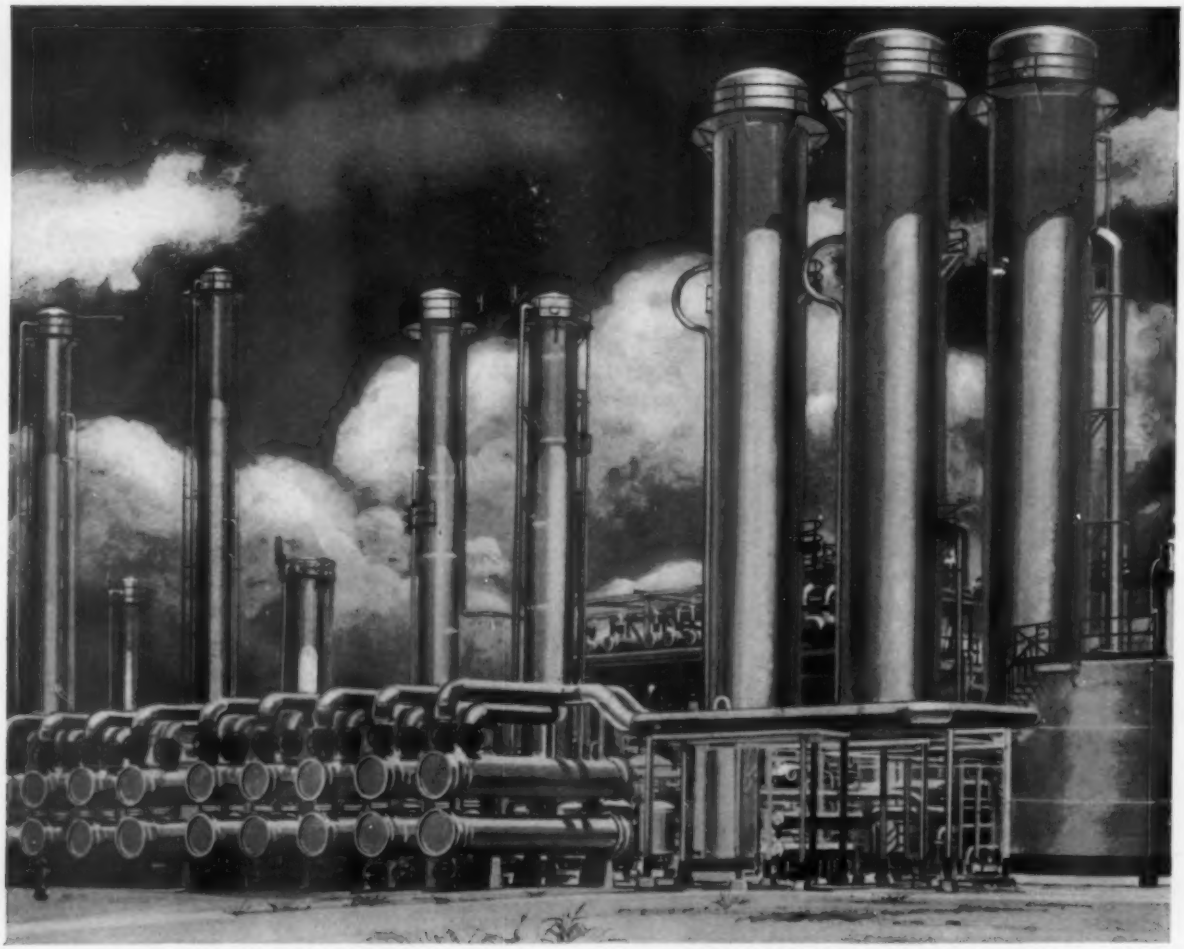
Through The Chemical & Industrial Corporation, complete facilities for nitric acid are available in all markets of the world. C&I plants employ the du Pont, high pressure process and are designed and constructed to their rigid specifications. Only the finest materials and components are utilized guaranteeing a maximum safety factor, a minimum of maintenance and tremendous day-in and day-out efficiency. C&I nitric acid plants are time tested and proven and the larger units can now be made self-sufficient after start-up.

An illustrated brochure is available on request.
Representatives in principal cities throughout the world.

THE CHEMICAL AND INDUSTRIAL CORP.

CINCINNATI 26, OHIO

Designers and Constructors of Plants for the Processing of Ammonia Available World-wide.



COREXIT protects your expensive equipment against internal corrosion *for only a few cents a day!*

Humble's COREXIT is a proven product with years of success in corrosion prevention in the oil and gas industry. Experience proves that COREXIT will provide 98% protection against internal corrosion in natural gasoline plants and natural gas cycling plants.

There are COREXIT formulas specifically designed to assure you almost total protection against internal corrosion in absorption units, distillation units, fractionation towers, vapor recovery systems, Girbotal units, and related heat transfer equipment. COREXIT is compatible with ammonia, and it is often desirable to team COREXIT with this type of neutralizer for complete coverage of a liquid-phase-vapor-phase system.

COREXIT is readily available at Humble wholesale plants throughout Texas and New Mexico.

For information on COREXIT in Illinois, Indiana and Kentucky, write or phone:

Mid-State Chemical Company, Inc.
Mt. Vernon, Illinois

For information on COREXIT in Oklahoma and Kansas, write or phone:

Pet-Chem, Inc.
Mayo Building
Tulsa, Oklahoma

● *Without cost or obligation, Humble's Technical Service engineers will assist you in solving your corrosion problems. For engineering service or further information on COREXIT, phone or write:*

Humble Oil & Refining Company
Sales Technical Service
P. O. Box 2180
Houston 1, Texas

HUMBLE

HUMBLE OIL & REFINING COMPANY

Statement of Condition

AT THE CLOSE OF BUSINESS DECEMBER 31, 1957

RESOURCES

Cash and Due from Banks	$107,194,939.88	
U. S. Government Securities	72,039,718.48	
Other Bonds and Warrants	11,821,041.89	$191,055,700.25
Loans and Discounts		96,014,993.42
Repurchase Agreements—U. S. Government Securities		9,930,000.00
Income Receivable Accrued		430,320.96
Stock in Federal Reserve Bank		375,000.00
Bank Premises		4,000,000.00
Customers' Liability Under Letters of Credit		290,731.12
TOTAL		$302,096,745.75

LIABILITIES

Deposits		$281,333,622.65
Letters of Credit Outstanding		290,731.12
Income Collected, Not Earned		391,455.66
Reserve for Taxes, Interest, Etc.		1,866,993.63
Capital—Common	$5,000,000.00	
Surplus	7,500,000.00	
Undivided Profits and Reserves	5,713,942.69	18,213,942.69
TOTAL		$302,096,745.75

Member Federal Deposit Insurance Corporation

E. I. HANLON
Chairman of the Board

A. E. BRADSHAW
Vice Chr. of Board and Chief Executive Officer

W. A. BROWNLEE
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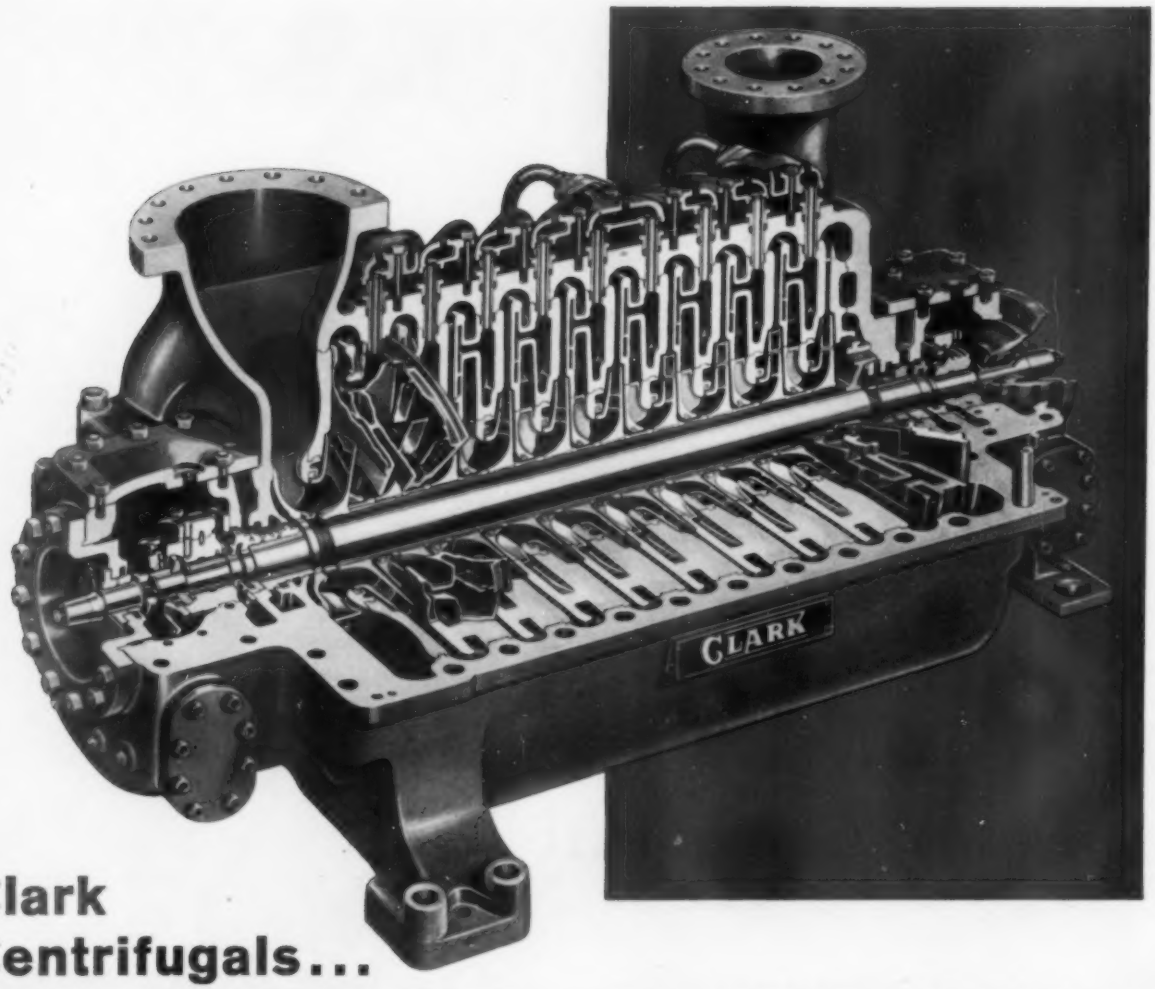
E. L. STUCKER
Senior Vice-President

NATIONAL BANK OF TULSA
THE OIL BANK OF AMERICA
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION



Clark Centrifugals...

PROVED DESIGN

gives higher compression ratios with built-in alignment at conservative speeds

Clark centrifugal compressor design with bearing supports cast integral with the case provides permanent alignment for the life of the compressor. This permits the use of up to 10 impellers in a single case without compromising safety. As a result, you get higher compression ratios at conservative speeds. This performance has been field-proved at every installation.

This design provides sufficient area to permit the use of any seal including the Clark pressure oil film type seal between the gas stream and the bearings.

In addition to a complete line of multi-stage centrifugals, Clark also builds a gas turbine to drive many of them. Design and performance of every Clark machine stems from Clark's encyclopedia of experience. Call your nearest Clark representative for all the facts. Or write today for Bulletin 150 to Clark Bros. Co., 1102 Lincoln Avenue, Olean, New York.

CLARK BROS. CO.

One of the Dresser Industries

Sales and service outlets in principal cities throughout the world

CLARK

CENTRIFUGAL COMPRESSORS • GAS TURBINES

run it right . . . with quality engineered

HINGED CASING SPIDER

BAASH-ROSS

Tubing and Hinged Casing Spiders

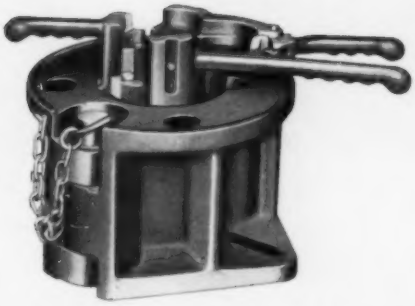
You can run the heaviest or lightest weight casing and tubing with Baash-Ross Spiders and Slips with no danger of crimping the pipe or losing the string when the slips are in place.

Made of high grade steel, Baash-Ross Spiders and Slips are available in sizes and types to meet every drilling and production requirement. Slips are unitized so that all surfaces grip the pipe evenly and firmly. The steep taper backs allow easy release.

Hinged Casing Spiders have a working capacity of 200 tons with a 3 to 1 safety factor and openings to handle up to 20" casing.

Type "TS 100" Tubing Spiders are adaptable to running single, double or triple tubing strings. An automatic, positive latch guards against accidental opening of slips for perfect safety, even while running multiple strings.

Baash-Ross Open End Spiders are rated at 100 ton capacity to run the longest tubing strings with complete safety. These spiders are engineered to handle the newest type high alloy deep well pipe available. 10" long slips hold firmly with no danger of collapsing the pipe.



"TS 100" TUBING SPIDER

OPEN END TUBING SPIDER

Protect your next well with proven Baash-Ross Spiders and Slips. Be sure your file contains complete information on all Baash-Ross equipment. For additional details, see the Composite Catalog or write Dept. B-127, P. O. Box 1348, Houston 1, Texas.

BAASH-ROSS DIVISION
of
JOY MANUFACTURING COMPANY

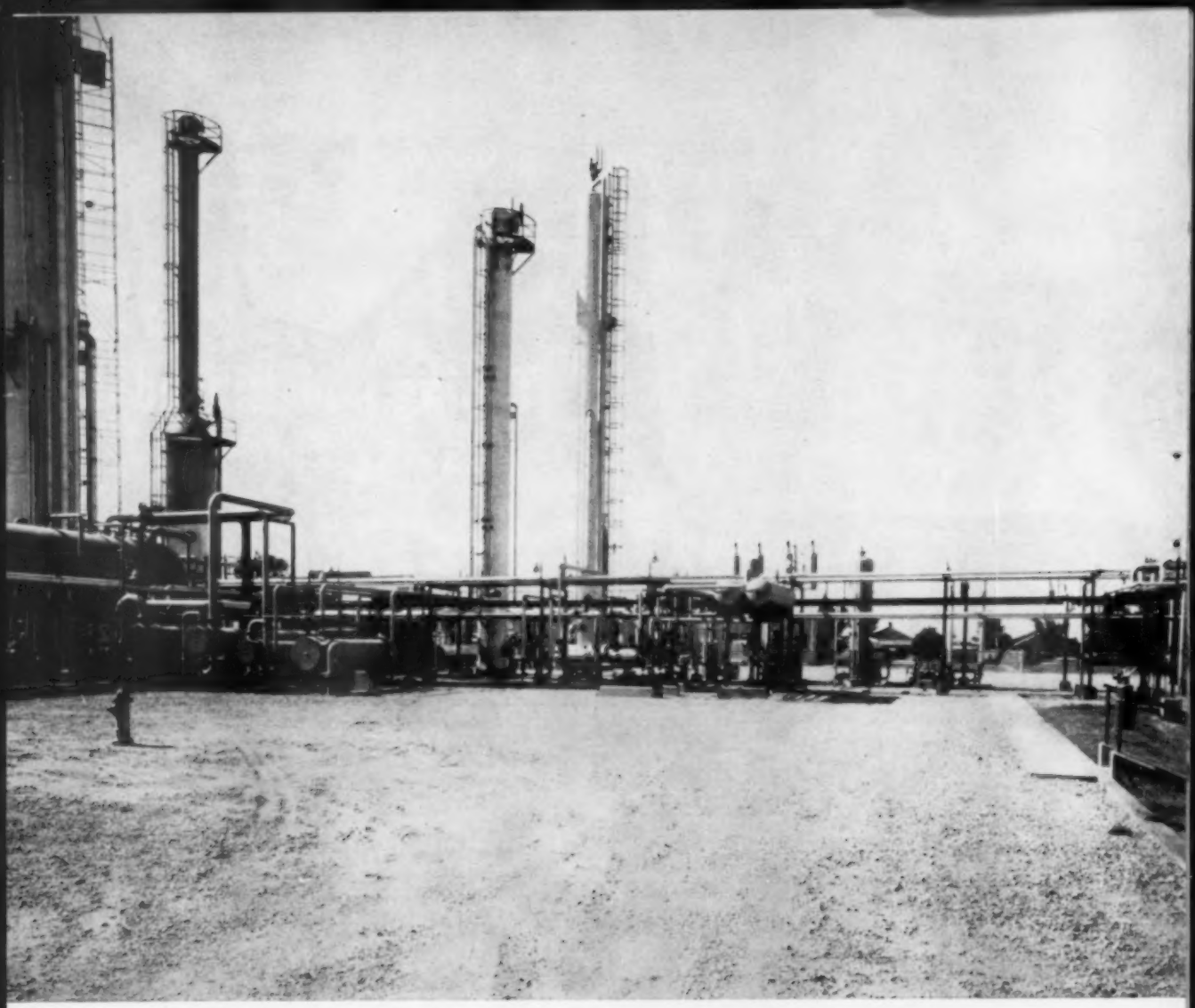
GENERAL OFFICES: 5306 CLINTON DR., HOUSTON, TEXAS

AREA OFFICES:

Houston, Texas; Odessa, Texas; Dallas, Texas; Long Beach, Calif.; Denver, Colo.; Oklahoma City, Okla.; Olney, Ill.; Mexico City, Mexico; Edmonton, Alberta, Canada.

FOREIGN OFFICES:

New York, N. Y.; Greenock, Scotland; London, England; Paris, France; Maracaibo, Venezuela; Buenos Aires, Argentina.



In this refinery of the Cities Service Oil Company, "Telvar", applied in May, kept area weed-free entire season. Throughout the oil industry, fire hazards and maintenance problems are greatly reduced by weed control with "Telvar".

Avoid fire hazards
Reduce maintenance costs—control weeds all season with one spraying

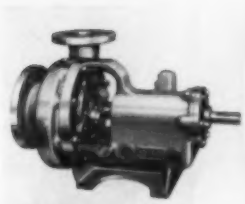
Now you can eliminate weeds and grasses that create fire hazards and make maintenance difficult. Just one application of Du Pont "Telvar" weed killer controls weeds for a season or longer. "Telvar" kills weeds through the roots . . . remains in the soil to provide residual action. Easy to handle, economical to use. Be sure to specify "Telvar"... for long-term weed control!

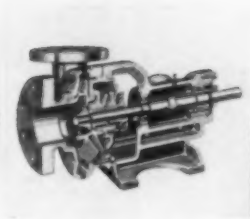
On all chemicals, follow label instructions and warnings carefully.

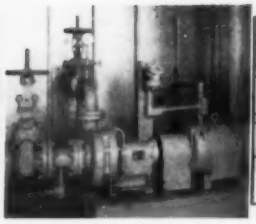
DU PONT
REG. U. S. PAT. OFF.
BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

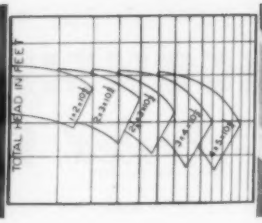
TELVAR®

MONURON AND DIURON WEED KILLERS









BECAUSE...
PEERLESS CHEMICAL PUMPS:

MEET critical standards of construction, you benefit from longer pump life, less maintenance, and sharply reduced incidence of system shut down caused by pump failure. Top quality Peerless construction means a dependable, rugged pumping unit you can count on to stay on the job for years longer.

PROVIDE proved operating history, you benefit from the knowledge that you're not buying a pump in the dark. Analysis by Peerless of customer pump operating records allows continuous product improvement. Correlation of this data provides Peerless with answers to nearly all field pumping problems.

OFFER optimum performance range, you benefit from the economical performance only the exact pump for the job can give you. The Peerless process pump line of over 78 models, sizes and frames, plus thousands of combinations, assures you of pinpoint pump selection that effects direct savings in cost.

EMBODY benefits of research in all areas of design, construction, and application. Typical of the many considerations in the design and manufacture of a Peerless pump is the ascertaining of effects of radial loads. **An interesting 8 page booklet discussing this phase of pump design is available to you upon request.**

Engineers and Pump buyers say:

NOW WE CAN BE SURE!

...buy and apply PEERLESS PUMPS

Putting Ideas to Work

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

Peerless Pump Division

Plants: LOS ANGELES 31, CALIFORNIA and INDIANAPOLIS 8, INDIANA

Offices: New York; Atlanta; St. Louis; Phoenix; San Francisco; Chicago; Fresno; Los Angeles; Plainview and Lubbock, Texas; Albuquerque.

Distributors in Principal Cities. Consult your telephone directory.

You get **MORE ENGINE**
for your money when you specify...

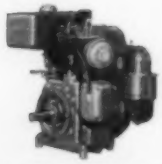
WISCONSIN Heavy-Duty Air-Cooled ENGINES

Supplied in a highly selective range of sizes from 3 to 56 hp., in 4-cycle single cylinder, 2-cylinder and V-type 4-cylinder models, the Wisconsin line offers the power user the *right engine* to fit the job and the machine, without power waste and with the greatest power advantage.

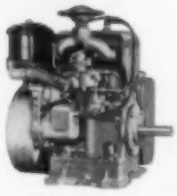
- All Wisconsin Engines are of heavy-duty design and construction ... to provide the inbuilt stamina, long-life endurance and low-cost maintenance so essential to heavy-duty service applications. Every Wisconsin engine is equipped with such extra-value features as tapered roller main bearings at *both* ends of the drop-forged crankshaft. Even the smallest models are supplied with FOUR piston rings.
- All Wisconsin Engines are of basic High Torque design to provide maximum *usable power* ... the *Load-Holding Lugging Power* that *hangs on* and *carries on* under severe shock-load operating conditions.
- All Wisconsin Engines can be adapted to operation on a variety of most readily available fuels ... gasoline, kerosene, LP fuels, natural gas or fuel oil of 38-42° Baume gravity and 35 Octane rating.
- All Wisconsin Engines are AIR-COOLED for efficient, trouble-free operation at temperatures from low sub-zero to 140°F. (60°C.).
- All Wisconsin Engines are backed by a world-wide service organization. More than 2,000 Authorized Wisconsin Engine Service Stations carry a stock of factory-recommended parts for *all models*.

The power user gets "more engine" per horsepower and per dollar invested in dependable driving power.

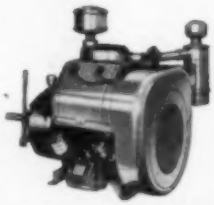
SPECIAL EQUIPMENT — All models can be supplied with variable speed controls, clutch take-off assembly, electric starter and generator (or starter only), Stellite exhaust valves and valve seat inserts (regularly supplied on Models THD, VG4D and VR4D) and positive type Valve Rotators. Clutch reduction assemblies available on all models except VG4D and VR4D. Rotating screen available for all models. High Temperature Automatic Safety Switch also available on all models except small single cylinder models. Special equipment must be specified at time engines are built.



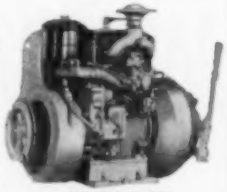
4-cycle Single Cylinder models, 3 to 12½ hp.



2-cylinder models, 10 to 18 hp.

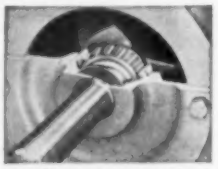


V-type 4-cylinder models 15 to 56 hp.



Model THPD
Oil Well Pumping Engine
Get the details about the new Wisconsin Oil Well Pumping Engine with Built-in High Momentum Factor.

- Large capacity cooling fan is integrally cast with the flywheel and provides correct heat dissipation at all temperatures up to 140° F.



- Self-cleaning, file-hard tapered roller bearings at BOTH ends of the crankshaft take up end-thrust and radial loads.

- Highly dependable weather-sealed high tension magneto with impulse coupling, outside mounted for easy accessibility, delivers fast starts at all times.

- Positive lubrication supplied by a pump-circulated splash system for smaller models. Geared lubrication pump on larger models delivers individual oil stream to each rod.

POWER AND WEIGHT SPECIFICATIONS

Single Cylinder Models					
MODEL	ACN	BKN	AENL	AEH	AGN
BORE	2⅝"	2⅞"	3"	3"	3½"
STROKE	2¾"	2¾"	3⅜"	3¼"	4"
NO. OF CYLINDERS	1	1	1	1	1
DISPL. CU. INCHES	14.88	17.8	23	23	38.5
HP. RANGE	2.5—6	3.5—7	4.7—9.2	4.4—7.4	7.7—12.5
SPEED RANGE—RPM	1600-3600	1600-3600	1600-3600	1800-3200	1600-3200
NET WT. IN LBS.					
Engine with Stub Shaft	76	76	110	130	180
Added Wt. for Clutch	26	26	35	35	35
Added Wt. for Reduction	18	18	25	25	60
Added Wt. for Clutch Reduction	—	—	60	60	80

Two and Four Cylinder Models							
MODEL	TH	THD	VE4	VF4	VH4	VG4D	VR4D
BORE	3¼"	3¼"	3"	3¼"	3¼"	3½"	4¼"
STROKE	3¼"	3¼"	3¼"	3¼"	3¼"	4"	4½"
NO. OF CYLINDERS	2	2	4	4	4	4	4
DISPL. CU. INCHES	53.9	53.9	91.9	107.7	107.7	154	255
HP. RANGE	10—16.4	10—18	13—21.5	15—25	14—30	25—37	43—56.5
SPEED RANGE—RPM	1600-2600	1600-3200	1400-2400	1400-2400	1200-2800	1400-2400	1400-2200
NET WT. IN LBS.							
Engine with Stub Shaft	205	205	295	295	310	410	775
Engine with Side Mount Tank	220	220	315	315	330	440	—
Power Unit with Stub Shaft	255	255	355	355	370	495	895
Added Wt. for Clutch	35	35	40	40	40	100	120
Added Wt. for Reduction	60	60	65	65	65	—	—
Added Wt. for Clutch Reduction	85	85	90	90	90	150	220

WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air Cooled Engines

WRITE TO HARLEY SALES CO.
618 S. Main Street, Tulsa, Oklahoma
3420 McKinney Ave., Houston, Texas
505 South Main St., Wichita, Kansas
OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS.

A7-6157-1PC-R

"wherever oil men gather"

● In the field . . . in the office . . . in sidewalk conferences . . . wherever oil men gather . . . you hear it more and more—

"For my money it's The Fort Worth National Bank!"

That's because oil men everywhere appreciate the fast, friendly, modern banking services The Fort Worth National offers to the petroleum industry.

Consult one of the petroleum engineers in our Oil Loan Department anytime at your convenience. Why not today?

85th ANNIVERSARY

THE FORT WORTH NATIONAL BANK

Helping Build A Greater Fort Worth and Southwest

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

CAPITAL AND RESERVE ACCOUNTS OVER $20 MILLION

THE MODERN TAPE COATING THAT'S CHANGING THE FACE OF YOUR INDUSTRY

WHEREVER THEY LEAD, THE NATION'S PIPELINES CAN NOW BE CONSTRUCTED FASTER...EASIER...WITH REAL SAVINGS, USING THIS TIME-TESTED POLYETHYLENE TAPE BY POLYKEN

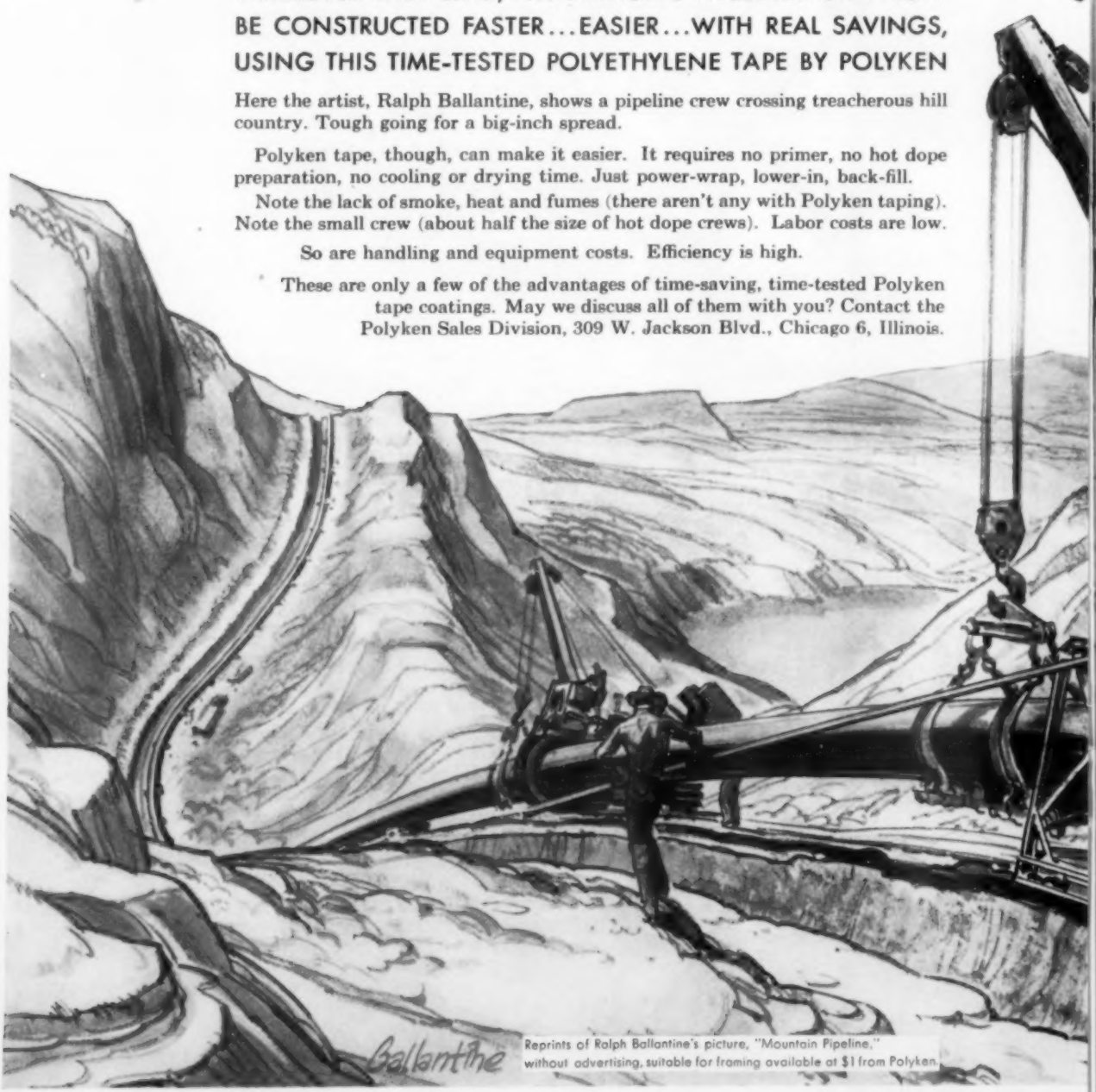
Here the artist, Ralph Ballantine, shows a pipeline crew crossing treacherous hill country. Tough going for a big-inch spread.

Polyken tape, though, can make it easier. It requires no primer, no hot dope preparation, no cooling or drying time. Just power-wrap, lower-in, back-fill.

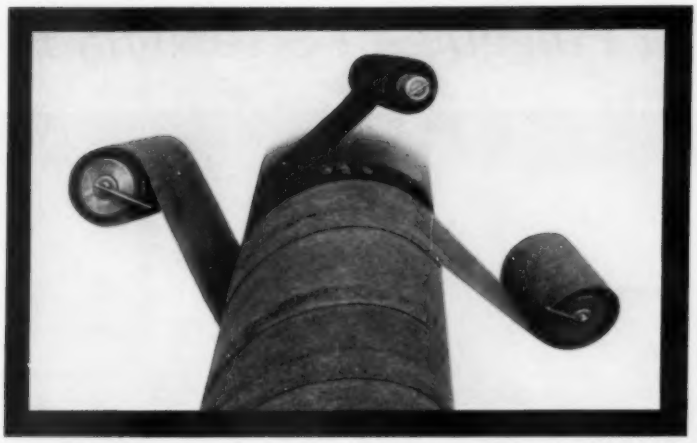
Note the lack of smoke, heat and fumes (there aren't any with Polyken taping). Note the small crew (about half the size of hot dope crews). Labor costs are low.

So are handling and equipment costs. Efficiency is high.

These are only a few of the advantages of time-saving, time-tested Polyken tape coatings. May we discuss all of them with you? Contact the Polyken Sales Division, 309 W. Jackson Blvd., Chicago 6, Illinois.



Reprints of Ralph Ballantine's picture, "Mountain Pipeline," without advertising, suitable for framing available at $1 from Polyken.



CLOSE-UP OF THE MODERN CORROSION FIGHTER

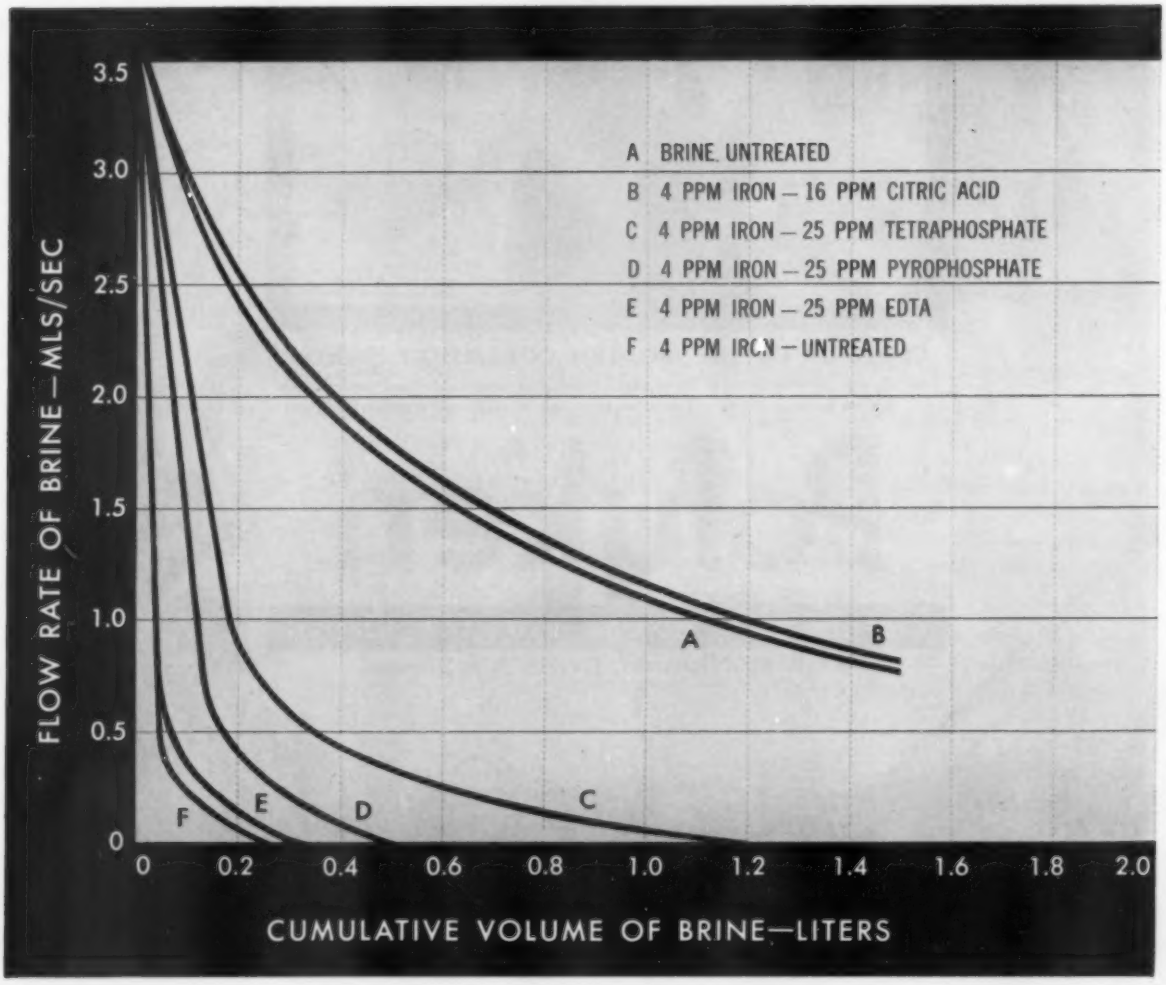
Strong, durable Polyken tape (black spool) is made of remarkably inert polyethylene . . . resistant to the corrosive effects of moisture, soil chemicals and electrolytic current.

Polyken®

EXPERIENCED IN MODERN PROTECTIVE COATING

The Kendall Company, Polyken Sales Division

Avoid Iron Plugging in Secondary Recovery



Add Citric Acid to Injection Water!

● The graph you see here shows the results of water treatment experiments that compared the effectiveness of Pfizer Citric Acid with a number of other commercially available sequesterants. The points where the flow rates have decreased to zero indicate the plugging volume of the solutions. Pfizer Citric Acid was the only sequesterant tested which maintained flow rates comparable to iron-free brine.

In the tests, conducted at the Pfizer Technical Service laboratory, a synthetic brine containing calcium and magnesium ions was prepared. Four samples were treated with different sequestering agents and soluble iron, one sample with soluble iron alone. A sixth sample remained untreated.

Flow rates were determined by passing the above solutions through membrane filter discs which contain 50 million uniform sized pores per square centimeter. These uniform pores approximate the pore size of the sandfaces through which your injection water must flow. The results, as you can see from the chart above, proved conclusive. Citric Acid was far superior in preventing the formation of insoluble iron compounds—kept flow rates highest.

If you want to stop iron from plugging sandface pores, add Pfizer Citric Acid to your injection water. It's nontoxic, safe to handle, and high calcium and magnesium waters do not interfere with its iron sequestering action.

Pound for pound, Pfizer Citric Acid not only sequesters iron better, but also at less cost than any other agent.

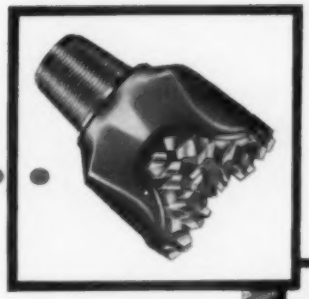
For full information write to:

Manufacturing Chemists for over 100 Years

Pfizer

CHAS. PFIZER & CO., INC.
Chemical Sales Division
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices:
Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Tex.

Bits...



Beans...

Barges...

the oil industry buys "world wide" from Mid-Continent

Rock bits . . . flow beans . . . a complete drilling barge . . . these are but a few of the thousands of items the world-wide oil industry buys from Mid-Continent Supply Company. With field stores and supply points in active oil areas throughout the world, Mid-Continent maintains in-the-field inventories of supplies and equipment . . . your assurance of sure service, sure supply.

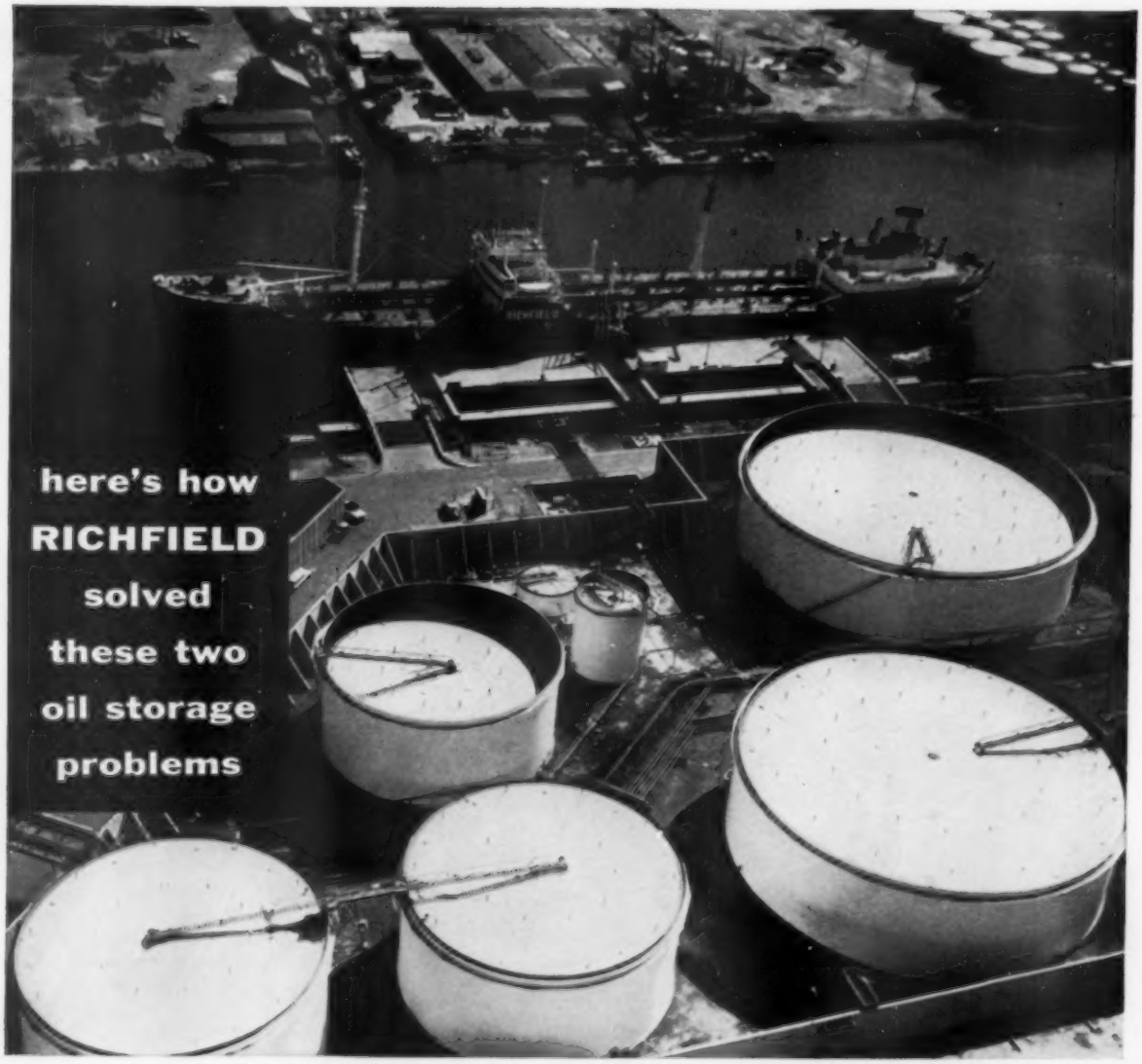
Mid-Continent furnished this turnkey drilling barge for operation on the Louisiana Gulf Coast.

MID-CONTINENT SUPPLY COMPANY

MID-CONTINENT BUILDING • FORT WORTH, TEXAS

Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY



1. FIRE HAZARD
2. VAPOR LOSS

"Wiggins Floating roofs by General American helped us prevent costly vapor loss and reduce fire hazard," says Tom Cook, manager of Richfield's Marine Terminals. "The 7-tank addition (more than 500,000 bbl. cap.) built by General American, met our every requirement. What's more, the conservation advantages mean these Wiggins roofs are economical because of the oil they save."

Wiggins Double-Deck Floating Roofs with the Wiggins Safety Seal, reduce vapor space under the circumferential fabric to an absolute minimum. This practically eliminates losses due to thermal breathing and serves to prevent rim fires. The fabric is of a new, long-lived type and a special weather-hood protects it from the sun. The seal mechanism is always out of the liquid and the corrosive vapor space. Only the Wiggins Safety Seal gives you all these advantages.

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GENERAL AMERICAN TRANSPORTATION CORPORATION
135 South LaSalle Street, Chicago 90, Illinois
Offices in all principal cities
It pays to plan with General American

comparison proves **WILSON PUMP** superior

WHAT THEY SAY:

PUMP – A – "MORE H. P. PER POUND"
PUMP – B – "51 POUNDS PER H. P."
PUMP – C – "43.8 POUNDS PER H. P."

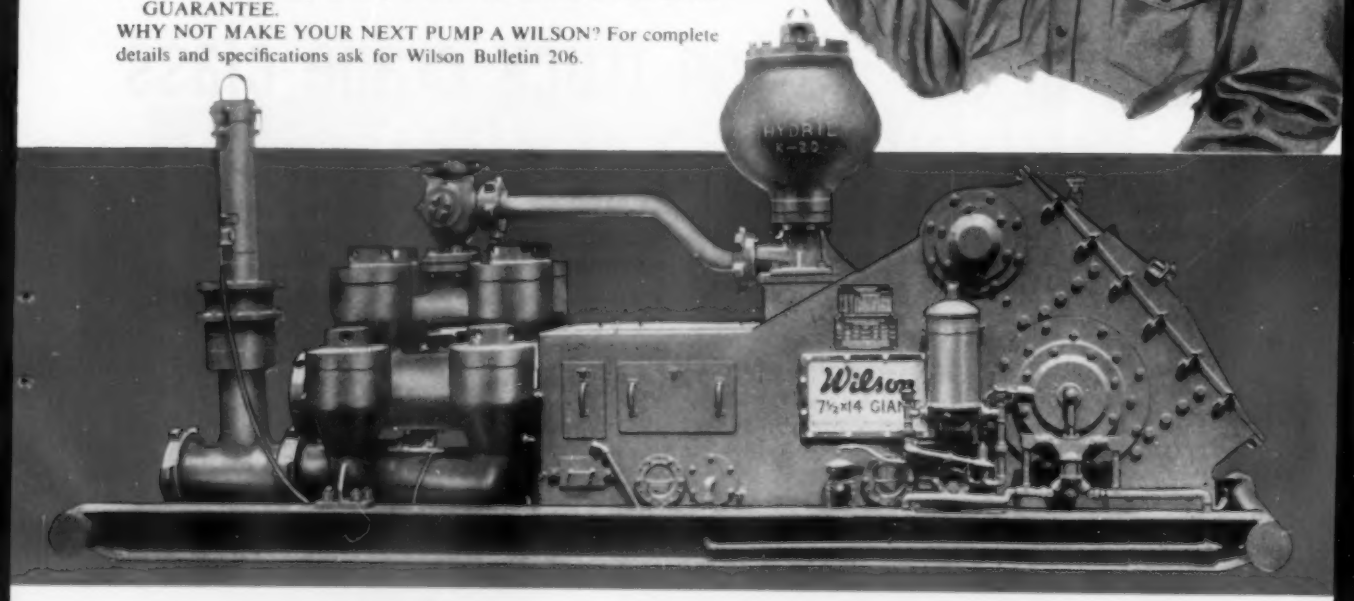
BUT THE WILSON GIANT PUMP WEIGHS ONLY

33 lbs. per H. P.

Just check the record . . . Wilson has proved to be the lightest, fastest, smoothest, and most efficient mud pump in the industry. It is the most revolutionary pump to be built in nearly thirty years because it gives the industry more advanced features. Among the most outstanding features exclusive to the Wilson pump are:

1. Chain drive for greater efficiency;
2. Lighter weight per horsepower, through the chain drive and overall steel construction;
3. Higher speeds with higher capacity and smoother mud flow through use of Suction Flow Equalizer.
4. Faster access to wearable parts such as valves, piston rods, liners, etc.;
5. It is the only pump to carry a FIVE YEAR ADJUSTED BASIS GUARANTEE.

WHY NOT MAKE YOUR NEXT PUMP A WILSON? For complete details and specifications ask for Wilson Bulletin 206.



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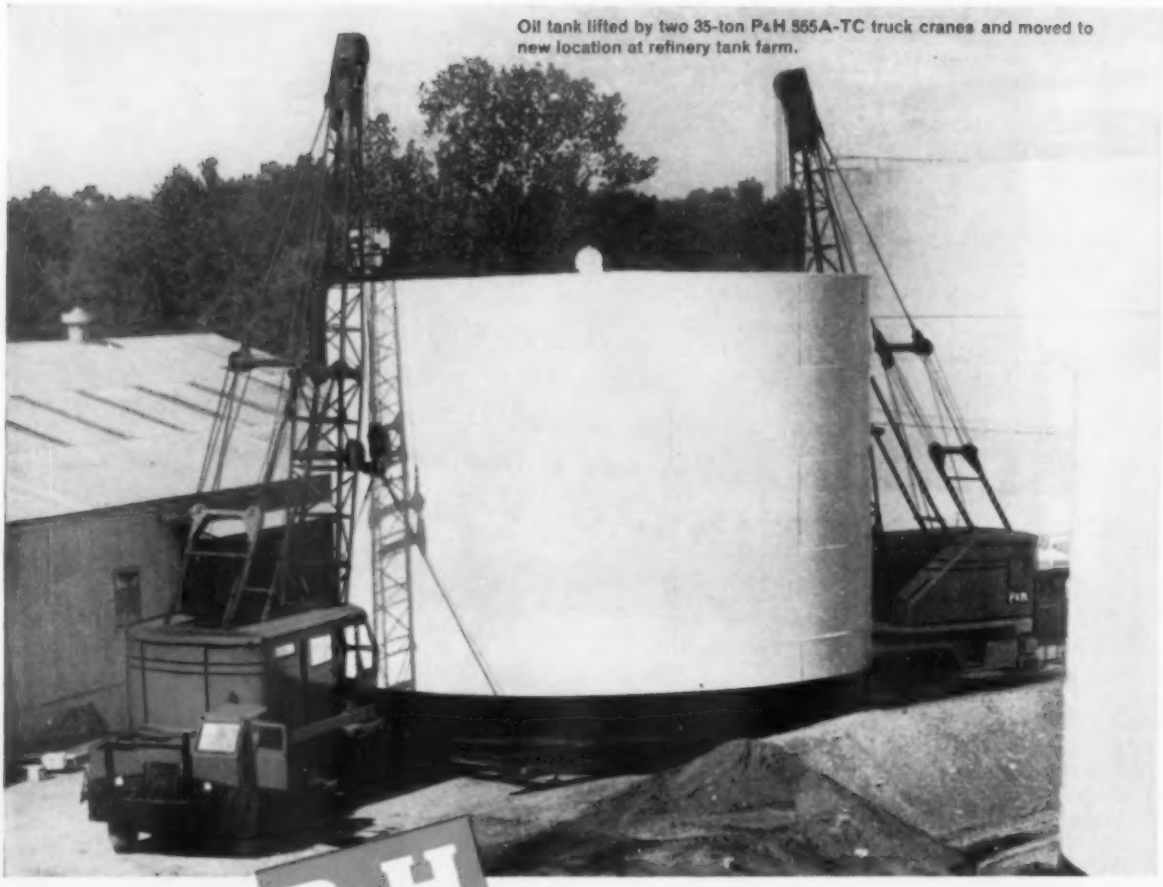

Oil tank lifted by two 35-ton P&H 555A-TC truck cranes and moved to new location at refinery tank farm.

THE P&H 555A-TC leads in the 35-ton truck crane class

At refinery, plant yard, pipeline or drill site—throughout the industry—the P&H 555A-TC is the unquestioned leader in the 35-ton truck crane class. Year after year it continues to create new records for profitable performance on all heavy-duty lifting, material handling and digging jobs.

Every feature of the 555A-TC adds to its versatility and ability to set new production records:

- **Independent planetary boom hoist—boom lowering is always done under power**
- **120-foot boom—30-foot jib**
- **Hydraulic controls for smooth, easy operation**
- **P&H "live roller circle" for fast lively swings**
- **All-welded, lattice type boom—stonger yet lighter**
- **P&H balanced weight distribution—greater stability**

Before you buy any power crane or shovel, get in touch with your P&H dealer. Write for complete information.

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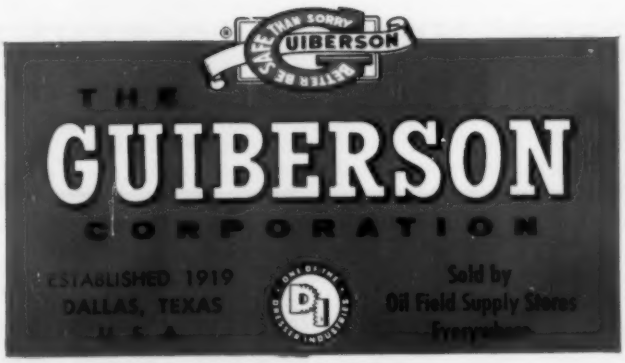
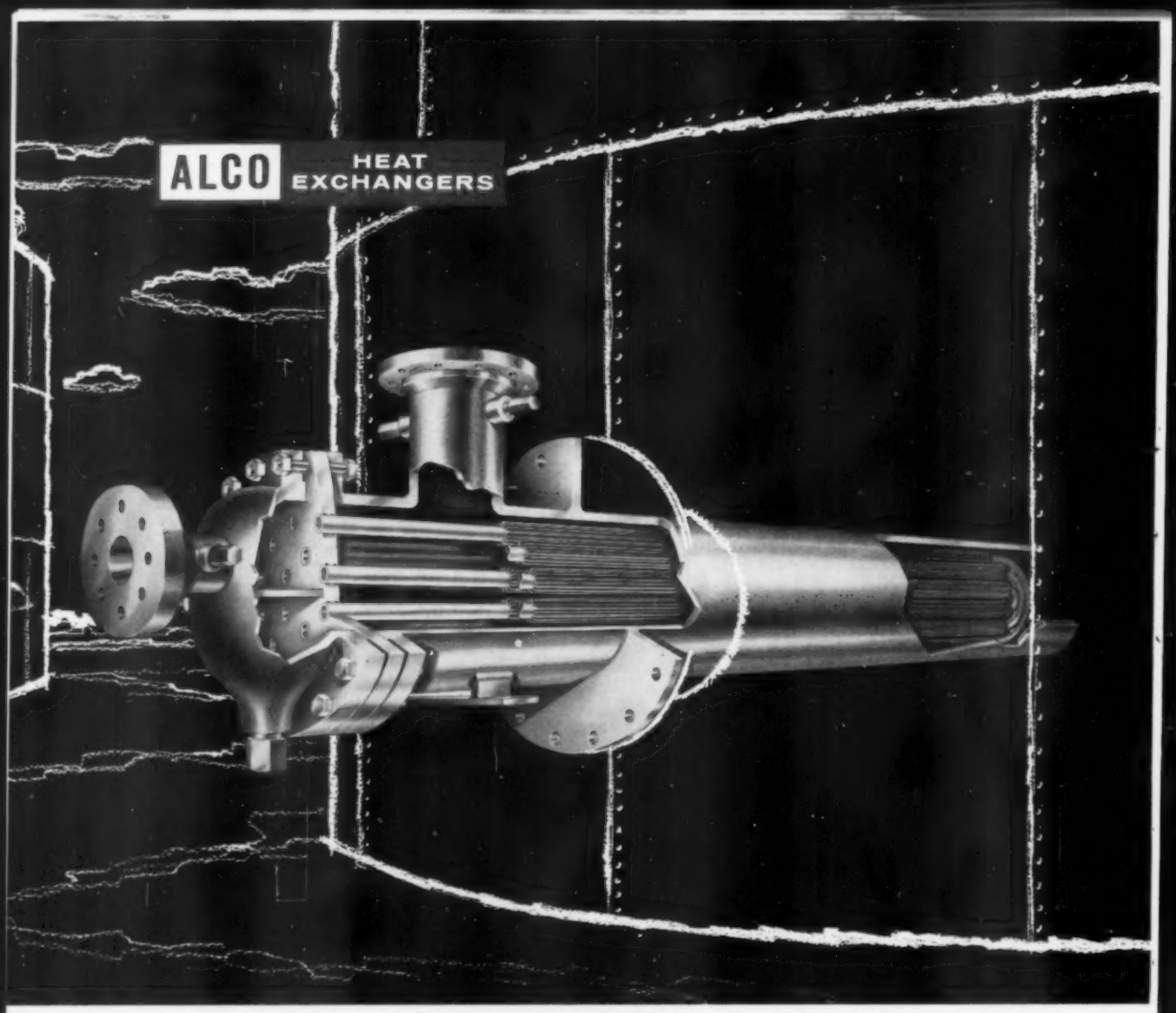
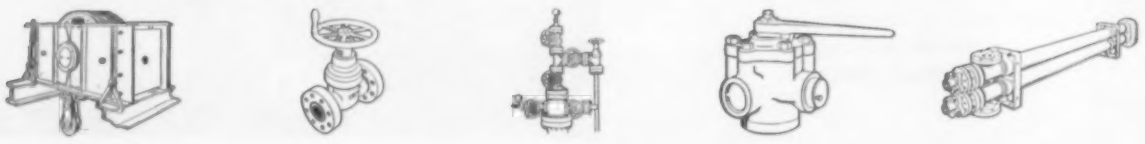
Our swabs do *good, low-cost* swabbing — in a minimum of time — making them most economical and efficient for *routine swabbing* all sizes of tubing, drill pipe and casing. We have many types of cups immediately available for *specific* and *unusual* swabbing problems.



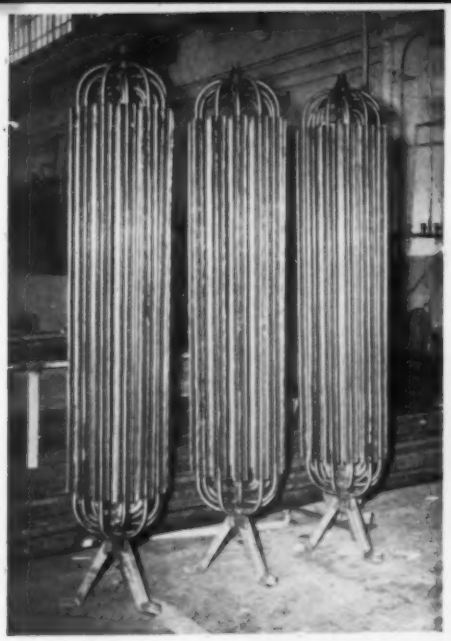


ALCO *tank suction heater with straight line heating does highly efficient job of heat transfer with minimum pressure drop.*

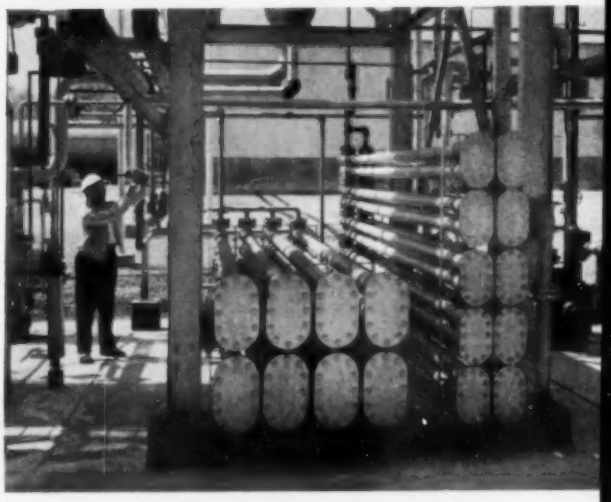
ONLY NEW ALCO FINNED TUBES MEET ALL PROCESS CONDITIONS



Crown and travelling blocks • Oil-field valves • Wellhead equipment • Kinney plug injectors • Finned tube products



ALCOHEATER, *mounted vertically in tanks, puts entire heating surface in contact with product. There is no restriction from accumulated sediment.*



ALCOTWIN® *heat exchanger offers "building block" versatility. Units can be simply rearranged to meet changing load or process conditions.*

Integral-finned tubes, made by ALCO, are the heart of every ALCO finned tube heat exchanger. Whatever your process application, you can select the precise fin and tube combination needed for best results. ALCO's welding method permits the widest range of metallurgy—carbon steel, stainless steel, low- and high-chrome alloys, non-ferrous alloys, Monel and Inconel.

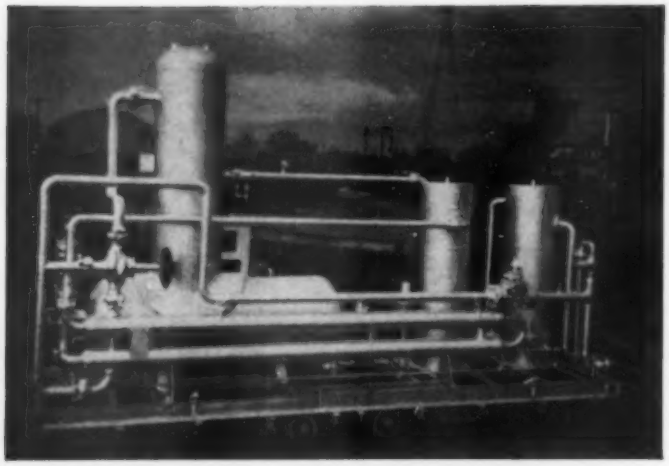
Heat transfer characteristics of ALCO integral-finned tubes are unequalled. A gas-shielded tungsten arc welding process provides a fused metal-to-metal bond between the "U" shaped fin channels and the tube. This sturdy construction assures permanent contact between fins and tube through thousands of heating and cooling cycles.

For many heat-exchange applications, the flexibility and adaptability of ALCO finned tube heat exchangers make them your best buy—now and in years to come. Complete information is available from any of ALCO's sales offices, or write Petroleum Industry Equipment Division, Dept. 183, Bank of the Southwest Bldg., Houston.

ALCO **ALCO PRODUCTS, INC.**
Petroleum Industry Equipment Division
HOUSTON

SHOWCASE...

NEW EQUIPMENT



Cold-Separation Unit Has Big Capacity

The skid-mounted Hyreco (hydrocarbon-recovery) separator handles 2,000 bbl. per day of distillate. It has a 30-in. o.d. vertical "cold tower" and a 36-in. o.d. horizontal accumulator for liquids. Design pressure of the separator is 2,000 psi.

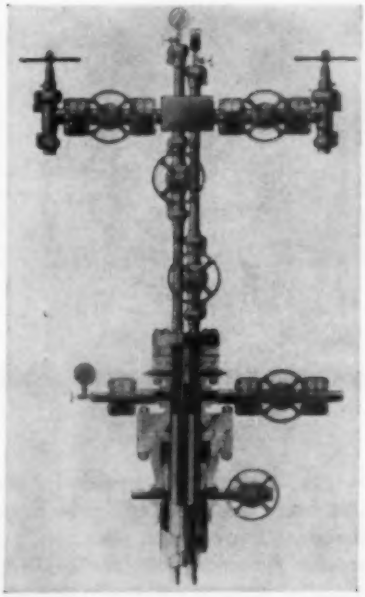
An internal pipe coil in the accumulator heats the cold liquid hydrocarbons that condense from the "cold" tower. The unit has two vertical liquid knockouts. These have a 4,000-psi. working pressure and provide initial separation of the incoming wellstream. A two-pass, tube-bundle heat exchanger cools the wellstream before it enters the "cold" tower. Approximate weight of the skid-mounted, cold-separation unit is 38,000 lb. **Write or call: Parkersburg Rig & Reel Co., P. O. Box 13295, Houston 19, for details on Hyreco units.**

Aluminum Gate Valves Available in ½ to 24-in. Size

After about 2½ years of development work and testing, the Darling aluminum-alloy gate valve is currently available in types for every requirement where aluminum piping systems are now being used or planned, the company reports. The valve incorporates the principle of fully revolving, double-disk parallel-seat, gate-valve operation.

In larger sizes, it's expected to permit sizable savings when compared with valves of other metals suitable for handling problem gases and fluids. **Write or call: Darling Valve & Mfg. Co., Williamsport, Pa., for details on aluminum gate valves.**

•



Christmas Tree Employs Bolted Couplings

The two-string christmas tree is said to be the first to use Unibolt connections throughout the assembly. The Rector Unibolt tree can be assembled and disassembled in the same way as a flanged tree, only quicker and easier, the maker says.

No threaded connections are used in the assembly. It gives the operator

---

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to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

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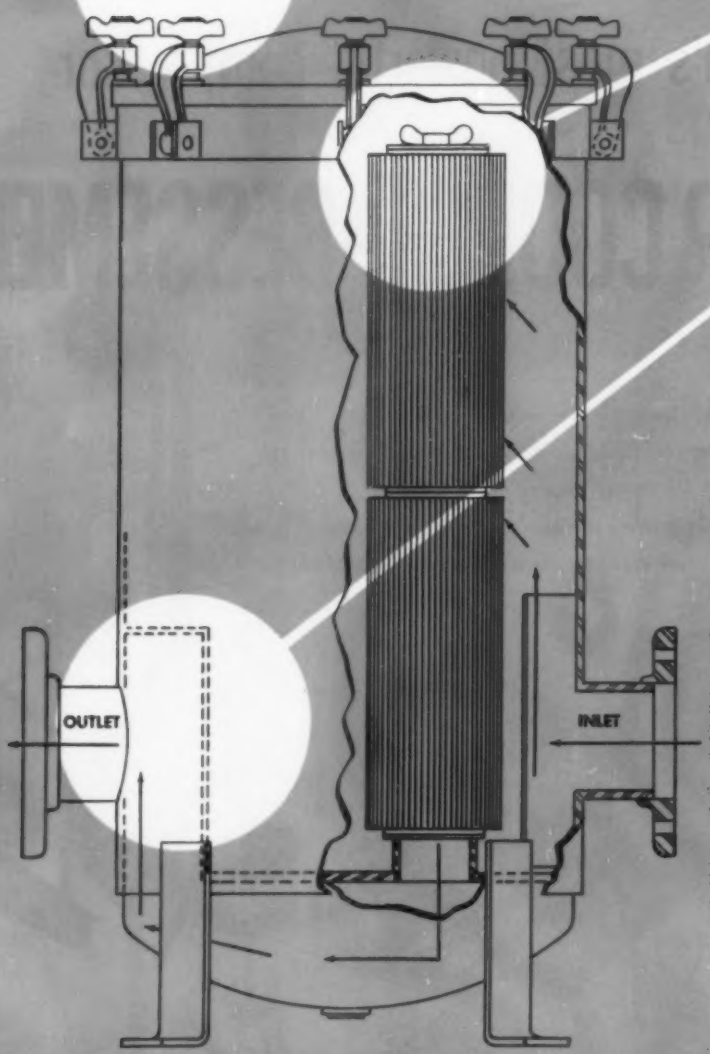

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Just a twist of the wrist and the top swings open. No special tools needed; eliminates nuts and bolts; no busted knuckles.

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Check these advantages • Simplified construction—low initial cost • Reduced size for compact installation • Quick opening cover and provision for instantaneous cartridge change • Improved filtration efficiency and greater dirt holding capacity . . . result . . . low cost maintenance • Very low initial pressure drop • Available for vertical or horizontal installation • Location of inlet and outlet connections to customer specifications • Wide range of product applications • Units in standard design or for code requirements • Non-ferrous construction available • Extra accessories including air eliminator, pressure gage, dump valve, etc., available.

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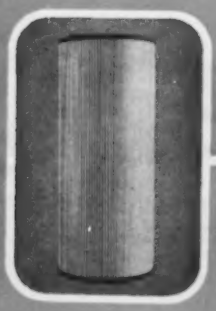

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THE NEWLY Developed
CH-57PL Cartridge combines

- Larger Outside Diameter
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- Greater Height

RESULT

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- Higher Flow Rates

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THE 10,000 HP COOPER-BESSEMER

Designed for the continuous compressing of large volume gas or air . . . in petrochemical, chemical, refinery and industrial operations . . . this 10,000 hp Cooper-Bessemer LM compressor not only delivers efficiency, economy and availability, but occupies no more space than other units of half the horsepower

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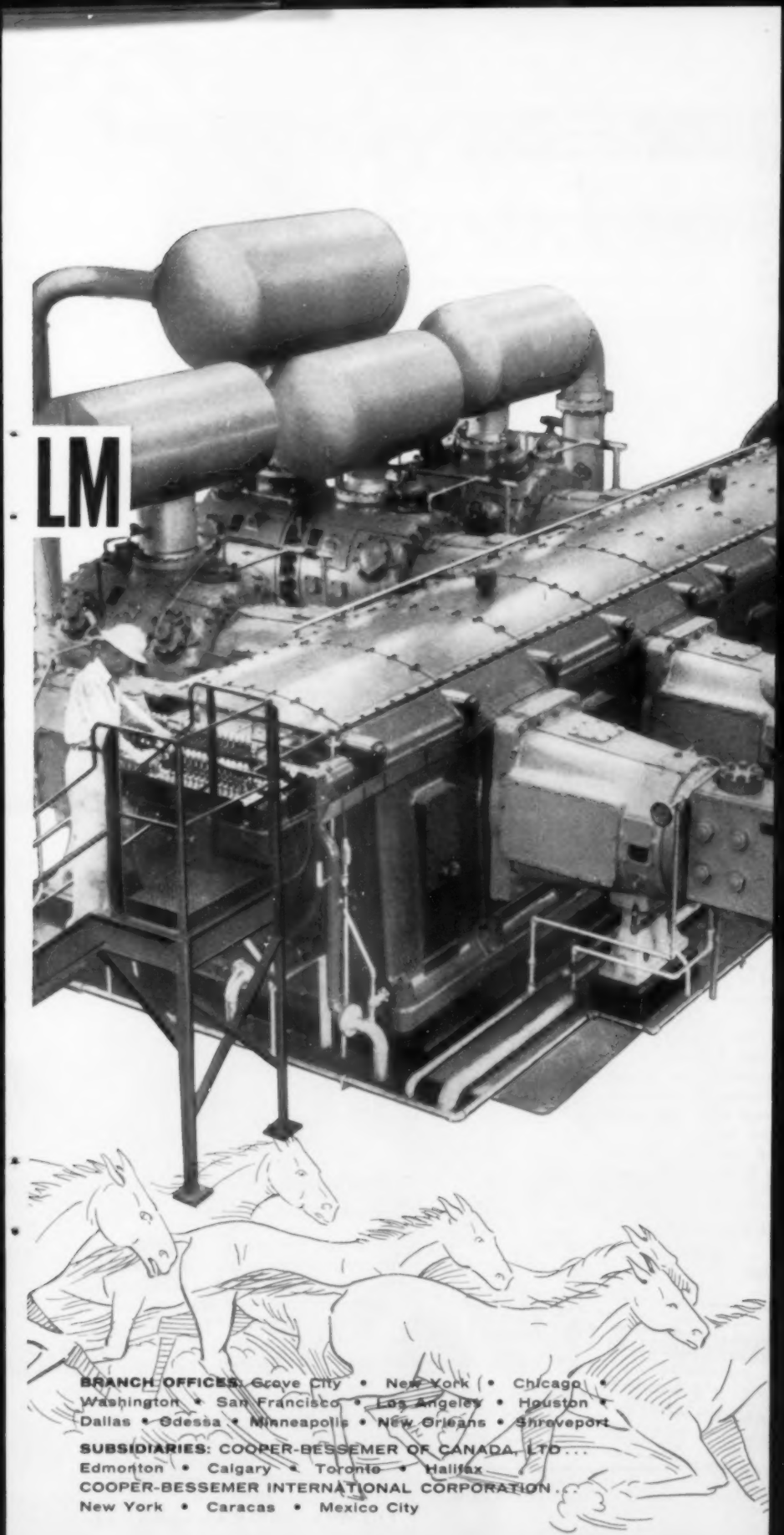

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the basic LM design offers you the very latest in design and engineering development. The nearest Cooper-Bessemer office will gladly furnish complete information.

THE LM COMPRESSOR OFFERS YOU THESE TEN IMPORTANT ADVANTAGES:

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SHOWCASE . . .

New Equipment

the advantage of a dual string with two separate verticals having metal-to-metal seals between each connection, the maker points out. The use of Unibo't connections also eliminates the need for an expensive master valve.

The tree has been extensively field-tested. It can be had with either Unibolt or block tees. Either design has both strings clamped together. **Write or call: Rector Well Equipment Co., 1100 North Commerce Street, Ft. Worth, for details on Unibolt tree.**

●

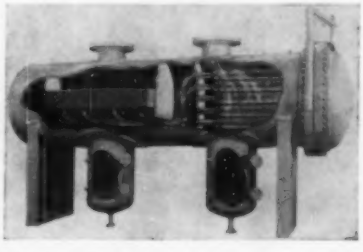
Lightweight Desander Is Easy To Install

The new Spiro-Jet desander weighs only 56 lb. Operating effectively under wide variations in pump pressure, it maintains clay and oil-base muds in a sand-free condition under all normal drilling operations, the maker says.

Made of oil and abrasive-resistant rubber, the one-piece liner is quickly replaced as a unit when worn. This feature does away with changing several separate rubber sections. It also cuts the replacement expense and down time often required. The liner is said to provide the exact conical design required for efficient desanding.

The desander can be mounted in the mud system as an individual unit, or can be manifold-mounted with a simple piping arrangement. The unit connects to a centrifugal pump or to the standby reciprocating pump. **Write or call: Grant Oil Tool Co., 2042 East Vernon Avenue, Los Angeles 58, for details on Spiro-Jet desander.**

●



Filter-Separator Removes Solids, Mist

Designed to separate liquids from gas streams containing finely divided mist, the Peco filter-separation unit operates as a two-stage system. First, the gas is preconditioned by coalescing liquid particles present into larger droplets. Next, these droplets are removed by a wire-mesh type of mist eliminator.

The manufacturer says the unit will efficiently remove mist and filter out any traces of solid matter present.

Typical applications include re-

Your Plant Water Systems MORE EFFECTIVELY PROTECTED

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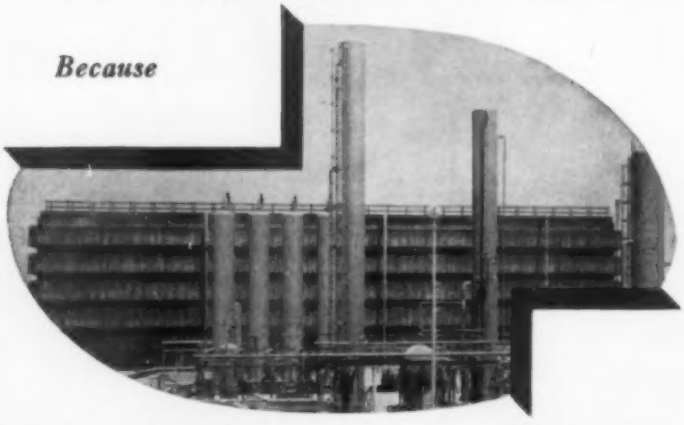

In Corrosion Inhibitors There Is A Difference

A difference which can be used to your advantage is present in the chemical composition and behavior of Haering's Organic Chrom Glucosates*.

A Chrom Glucosate* inhibitor film is tough, tenacious, elastic yet adherent, self-sealing and impervious. Is particularly effective in waters with high sulfate and chloride contents** or where process streams introduce various complex reducing contaminants. The organic Glucosates are used at low dosage rates over wide ph range. No more expensive and often cheaper to use.

Without cost or obligation find out how "Organic Methods" can provide extraordinary protection to water-using equipment in your plant.

**In use 8 years in a Cooling System where chloride content exceeds 25,000 ppm at times.

*Reg. U. S. Pat. Office

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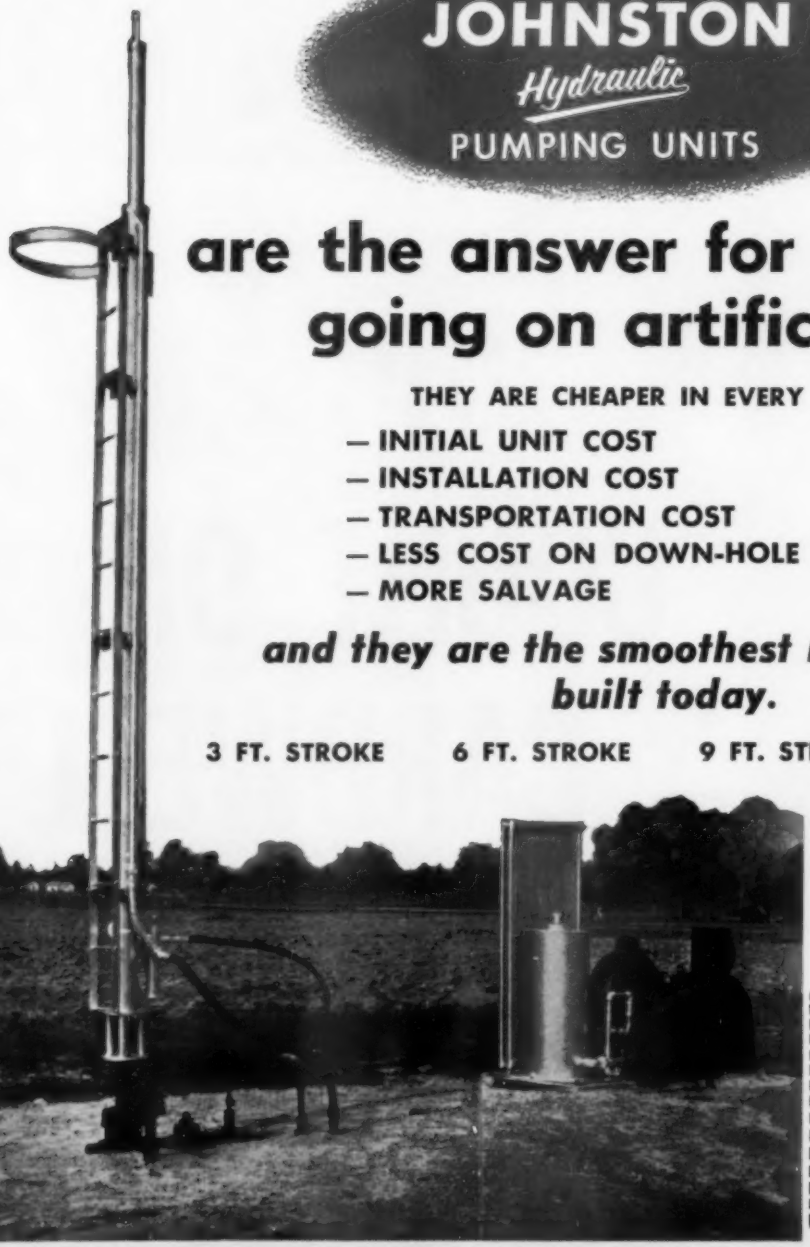

are the answer for your wells going on artificial lift.

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Cardwell Model M250 Travelrig

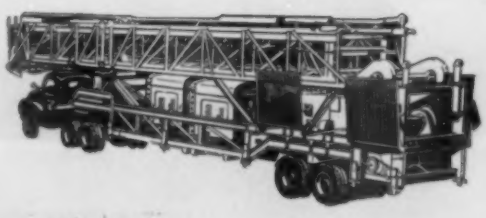
Heavy-duty, self-propelled "Drive-In" for servicing and workover to 13,000 ft., pulling 2½" tubing. Drills to 10,000 ft., using 2⅞" drill tubing, as a deep slim hole rig. Built-in draw works features large brakes and large drums for three-wrap spooling. Unit has high maneuverability and a short turning radius — with width and height well within legal limits of most states.

Good Operators Know:

YOU CAN COUNT ON CARDWELL

Cardwell "Trailerig"

A fast-moving, unitized, portable rig with complete flexibility for slim hole or conventional drilling. Draw works provided to accommodate one or two engines, and is designed into bridge-type trailer frame. The two-engine version permits pump drive. Includes 103 ft. four-leg telescoping mast. Depth rated to 10,000 ft. workover and to 5,000 ft. for drilling, using 4½" drill pipe. Moves on all ordinary highways with a standard fifth-wheel-type tractor.



Cardwell Model K200

Double drum rotary workover-servicing hoist offers minimum weight and rugged precision construction — with wide versatility in mounting. It can be truck-mounted and operated from truck power take-off or independent power. The K-200 may also be trailer mounted on various heights of Cardwell "Trailermasts." Unit is available with single or double leg pipe masts or structural telescoping masts. Servicing and workover depth rating is to 9,000 ft. The large sand line drum accommodates 13,150 ft. of 9/16" line. Nominal input horsepower is 240 H. P. Extremely easy to transport and rig up.

— And, more and more of them are doing just that! In the Four-Corners Area alone, 16 outstanding operators are using Cardwell servicing, workover, and drilling equipment. They expect, **and get,** dependable, round-the-clock performance under rugged field conditions.

Whether your operation is in the Four-Corners — or one of the four corners of the earth — you can depend on this: **Cardwell equipment will make money for you!**

The advanced engineering designs, quality-controlled materials, and experienced workmanship that go into each piece of Cardwell equipment mean more dependable, **more profitable,** performance for you!

Below is a list of a few of the operators using Cardwell equipment in the Four-Corners area:

Ray Wiley Bloomfield, N. M.	Gardner Bros. Drilling Co. Farmington, N. M.
J. P. (Bum) Gibbins Aztec, N. M.	Empire States Drilling Corp. Farmington, N. M.
S. S. Reams Well Servicing Co. Bloomfield, N. M.	H. B. R. Well Service Farmington, N. M.
J. G. Roberts, Inc. Aztec, N. M.	Rio Arriba Drilling Co. Cuba, N. M.
Christy Well Service, Inc. Cortez, Colo.	C. L. (Cluke) Meyers Drilling Co. Cuba, N. M.
George W. Riley Aztec, N. M.	Signal Oil Field Service Farmington, N. M.
Fay Campbell Cedar Hill, N. M.	Lee Cunningham Well Service Farmington, N. M.
Rota Cone Oil Field Operating Co. Aztec, N. M.	Barron Drilling Co. Farmington, N. M.

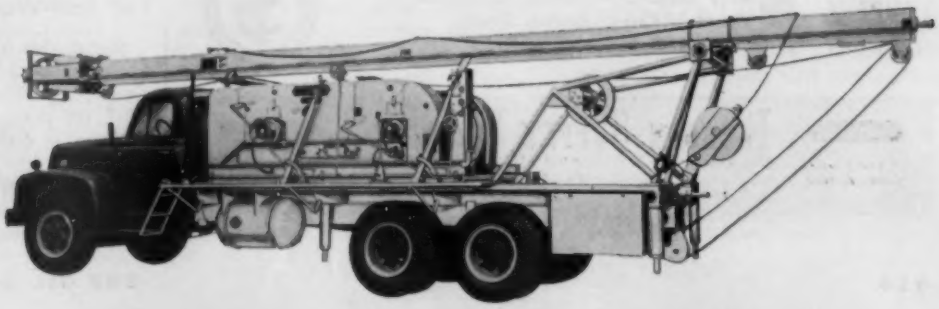
For full information call your nearest Cardwell representative

cardwell MANUFACTURING COMPANY

BOX 2001 • WICHITA, KANSAS, U. S. A.

Cardwell Model K203

Double drum servicing hoist with power take-off designed for fast, lightweight mobility. Depth rating: 9,000 ft. for well servicing. The large sand line drum accommodates 13,150 ft. of 9/16" line. Unit is located well forward to allow ample storage for tools, blocks, and other equipment. Handles easily — on the road or in the field.



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All of our suppliers are well-known in the oil industry. We have worked with many of them for over 25 years in supplying our customers with quality products that they could depend on with confidence.

Our service is known throughout the Iverson Supply Company area for the speed and efficiency with which customers orders are filled. And, all equipment handled is backed by the Iverson Guarantee of Satisfaction.

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Reed Roller Bit Company
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Waukesha Motor Company
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New Equipment

moval of traces of compressor oil from compressed gases and preconditioning of gas streams before further processing—such as in gas dehydration or liquefaction. **Write or call: Perry Equipment Corp., Mineral Wells, Tex., for details on filter-separator unit.**

●

Heat-Transfer Cement Aids in Steam Tracing

Called Thermon T-3, the product is a fine-grained, relatively slow-drying, heat-conducting cement. Its purpose is to fill the voids between a vessel surface and an external-embossed type of plate coil installed for either heating or cooling the contents of a vessel.

Use of the cement does away with heat transfer from the plate coil to the vessel wall through an air gap by providing a path of solid heat-conducting material. This greatly increases the efficiency of a plate-coil system and results in increased production at reduced cost, the maker states. **Write or call: Thermon Mfg. Co., 1017 Rosine Street, Houston, for details on Thermon T-3.**

●

Ductile-Iron Pump Built For Salt-Water Disposal

Suited also for crude-pumping stations, the ductile-iron pump is completely self-oiling. Designated Myers 5707, the pump is designed to deliver 7 g.p.m. at 400 psi. continuous pressure.

Stainless-steel ball valves are used in the pump to resist the corrosive effect of salt water. Special air cham-

COLUMBIA-SOUTHERN CHLORINE: *matchmaker at work*

Every town, and often neighborhood, has its inveterate matchmaker. With economical precision of insight, the matchmaker pairs the young . . . and sometimes not-so-young . . . into couples. Shy youngsters are gently prodded from their corners, the too enthusiastic cunningly curbed, the "not interested" patiently taken in hand.

Day after day in plant after plant, Columbia-Southern chlorine steps in to smooth problems in processing "romance." Compound C just can't tolerate Compound F . . . Compound XY won't be nudged into a molecular change . . . Compound Z refuses to alter its awkward form! Only until the transforming touch of chlorine, working through oxidation, addition, or replacement reactions, so quickly creates the favorable conditions needed.

Columbia-Southern chlorine *is* uniquely adept at this vital matchmaking. Its history begins with our extraction of the purest brine from wells thousands of feet deep, continues through painstaking separation in the world's most modern facilities, reaches its peak in delivery to you by such Columbia-Southern pioneered improvements as fusion-welded tank cars or inland waterways barge fleets.

So as your requirements for chlorine grow, why not contract with the country's leading, most experienced merchant producer? Contact Columbia-Southern today for chlorine that matches wits with your *processing*, not with you.

COLUMBIA-SOUTHERN CHEMICAL CORPORATION
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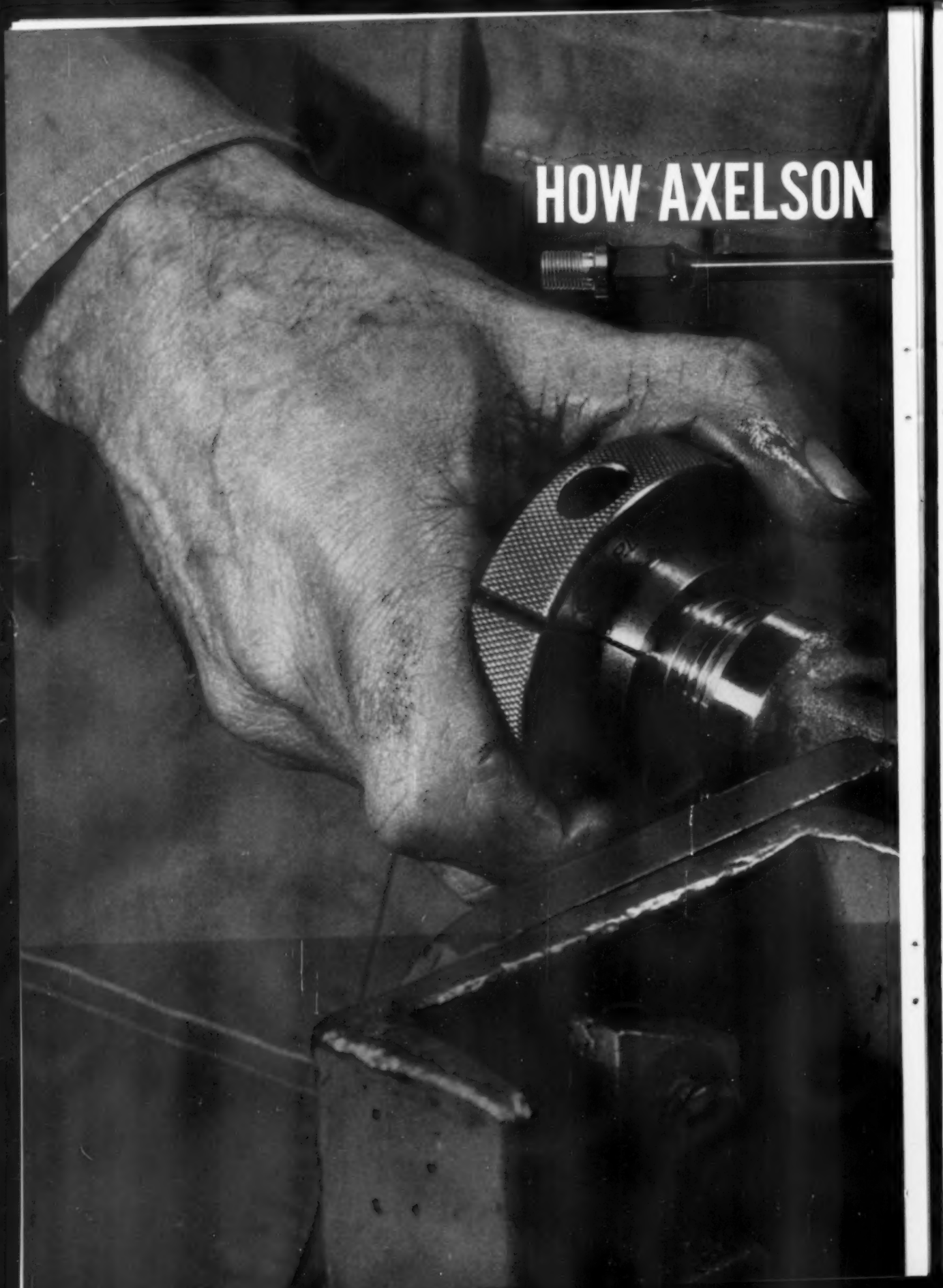

HOW AXELSON

PUTS MORE LIFE IN SUCKER RODS

100% inspection guarantees perfect threads

Expert AXELSON inspectors test *both ends of every sucker rod* with three precision thread gages. Their job is to assure perfect threads – preventing sucker rod failures that result in expensive pulling jobs and down-time.

Each rod is checked for accuracy with "Go," "No-Go" and "Standoff" thread gages. In turn, these instruments are checked daily for accuracy against master API gages.

The moment a rod comes off the threading machine, pin threads are carefully inspected to maintain constant control over machine performance. Seconds later threads are coated with a heavy protective compound to prevent rust and corrosion . . . a thread protector is screwed on at one end and a Parkerized coupling with a plug added to the other. After its seventh and final inspection, another AXELSON sucker rod is ready to go to work. *For complete sucker rod comparison data, write for Chart PO10-PS9A.*

In 59 years of manufacturing equipment for the petroleum industry, AXELSON has pioneered many methods for putting more life in sucker rods:

METALLURGICAL CONTROL OF RAW MATERIALS . . . the first step in quality control.

HEAT TREATMENT . . . to insure uniform grain structure, strength, shock resistance.

ABSOLUTE STRAIGHTNESS . . . checking and rechecking after passing through a Medart bar straightener.

FORGING . . . to exact alignment with precision forging dies.

CLEANLINESS . . . complete removal of "scale" by shot blasting.

PAINTING, STORAGE AND SHIPPING . . . the important final steps in manufacture.

AXELSON

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

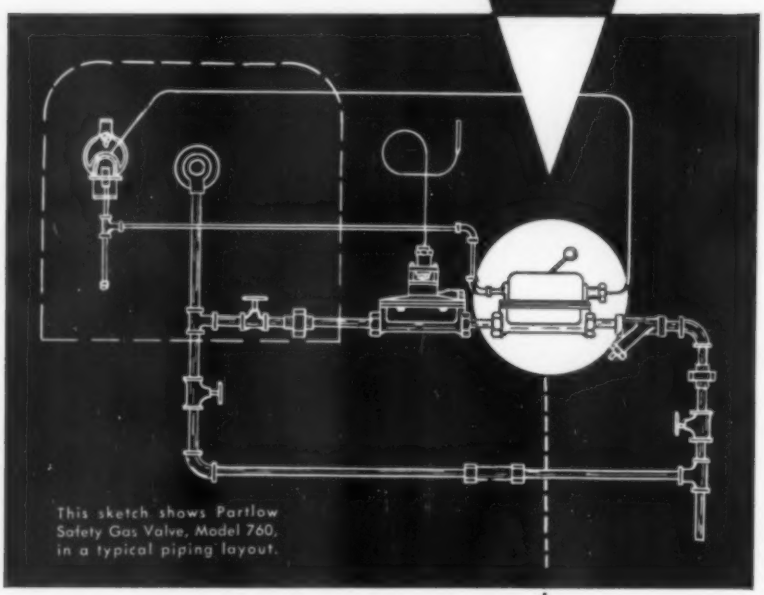
AXELSON MANUFACTURING COMPANY

Division of U.S. Industries, Inc.
6160 So. Boyle Avenue, Los Angeles 58, Calif.

Every AXELSON sucker rod *is checked at both ends with three thread gages. Protective coating, coupling and cap are added immediately after inspection to protect threads and prevent rust or corrosion.*

The threads of AXELSON *Parkerized couplings undergo the same rigid inspection as rod pin threads. Accuracy of coupling and rod pin threads assures perfect alignment, tight joints with greatest bearing surfaces.*

Here's **positive protection** against gas pilot failure



This sketch shows Partlow Safety Gas Valve, Model 760, in a typical piping layout.

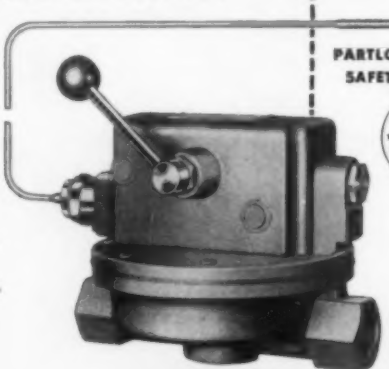
The Partlow Safety Gas Valve is ideally suited to oil field applications. *It's thermally operated . . . requires no electrical connections.*

This combustion safeguard gives positive protection to gas-fired appliances . . . prevents damage from gas pilot failure.

Rugged valve opens only after mercury actuated element becomes red hot from contact with pilot flame. If pilot goes out, element cools and releases a latch, causing valve to snap shut.

No conventional slip stem to corrode and stick. Strong perforated diaphragm guides valve disc to its seat.

PARTLOW MODEL 760 SAFETY GAS VALVE



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SHOWCASE . . .

New Equipment

bers prevent damage from sudden back pressure or surge.

An extra-large spring-loaded stuffing box is used to prevent leakage. It requires no adjustment.

The gear case serves as an oil reservoir. It is completely enclosed to protect moving parts from foreign materials. A continuous flow of oil is provided by the lubricating system.

Two large, double, ductile-iron main gears provide a balanced construction and prevent side strain on the pump. The pinions are cut integral with the shaft. **Write or call: F. E. Myers & Bros. Co., Ashland, Ohio, for details on ductile-iron pump.**

●

Lowering-In Belt Made for Coated Pipe

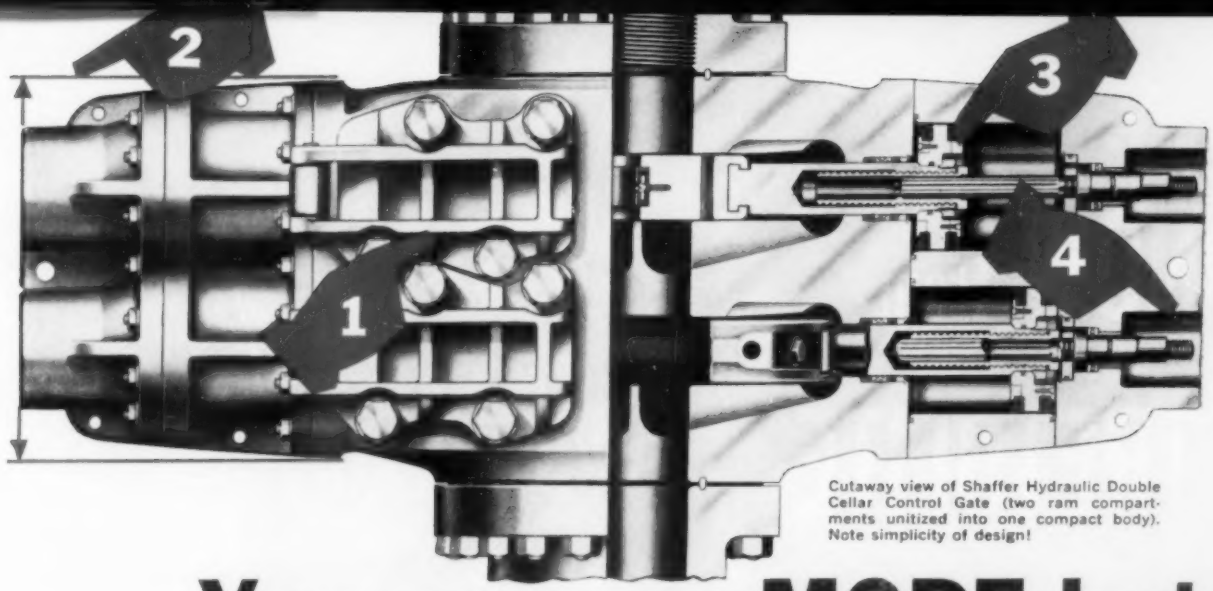
The woven interlocking steel links on this new lowering-in belt are closely spaced for strength. They make up the inner reinforcement of the pipe sling.

Each row of links is flexible. A hard sheath of rubber encloses them on both sides. Rubber is compressed between them for added strength.

Ultimate lifting caacity of the 36-in. pipe sling is 180,000 lb. Over-all thickness of the sling is 5/8 in. This feature makes the sling easy to use in tight ditches.

The sling iron is a one-piece unit. Special hooks prevent the sling from accidential disengagement.

The pipe sling comes in five sizes for 12 through 36-in. pipe. **Write or call: Crutcher-Rolfs-Cummings, Inc., P. O. Box 2073, Houston, for details on pipe sling for coated pipe.**

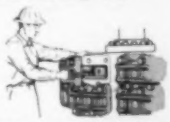


Cutaway view of Shaffer Hydraulic Double Cellar Control Gate (two ram compartments unitized into one compact body). Note simplicity of design!

You can pay MORE but you can't buy BETTER than SHAFFER Cellar Control Gates

Before you buy your next cellar control gate equipment, check the field. Note the unique **years-ahead** *features built into Shaffer Hydraulic Gates. Compare—and you'll find you can pay* **more** *for cellar control gates, but you can't buy better than Shaffer!*

ADVANTAGE #1



Simply open convenient side doors to change rams—and closing the doors automatically aligns the new rams for proper operation. No extra room is needed above the gate—nor is added space required at the ends—to change rams. Moreover, complete ram changes can be made whether the pipe is in or out of the hole!

ADVANTAGE #2

Shaffer Gates are not only compact in all three dimensions—length, width and height—but there's no need to expand the gates endwise to change rams, nor need extra space be allowed above the gates for lifting out the rams. Even sizes as large as 13⅝" (12" Series 900) are only 18½" high in Single Gates—only 30" high in Double Gates!

ADVANTAGE #3

In Shaffer Gates there are no complicated yokes, no secondary connections between pistons and rams. For maximum safety and simplicity, each ram is operated by a single direct-connected piston!

ADVANTAGE #4

Whether you prefer the extra compactness of a non-rising locking shaft, or the quick indication of ram position afforded by a rising shaft, you choose the design you prefer when you select Shaffer Gates!

In addition, Shaffer Gates have *Self-Draining Compartment Bottoms* (no detrimental sand or mud accumulates to interfere with free ram travel)... *Completely Enclosed Design* (no exposed moving parts to become damaged or corroded)... *Built-In Flow Connections,* and many other unsurpassed features that add up to greater safety, greater dependability, greater convenience. Get the full story from your nearest Shaffer representative—or write direct for further details!

FREE! Send for your copy of the complete Shaffer Catalog.

See the Shaffer section of your latest Composite Catalog.

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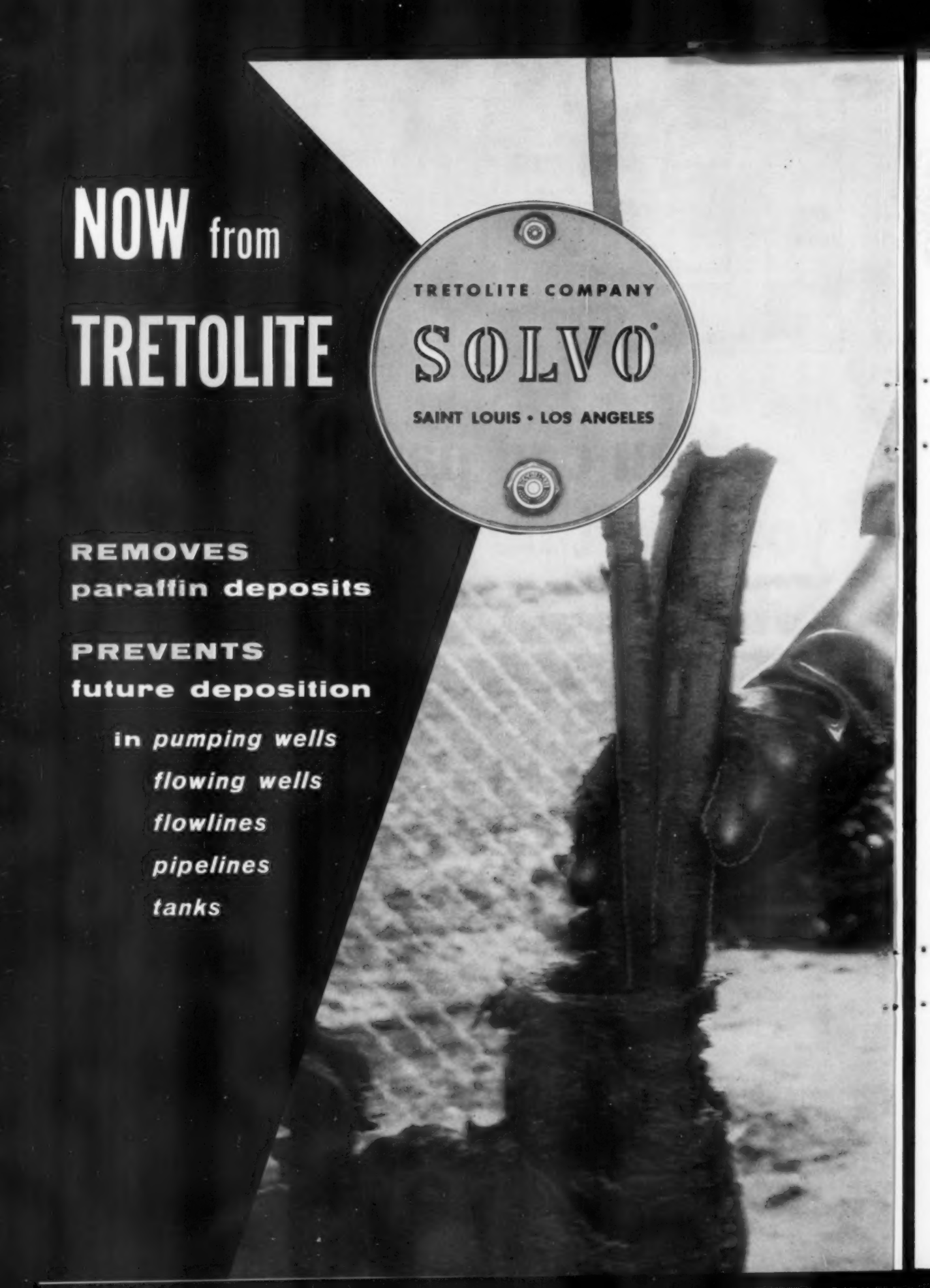
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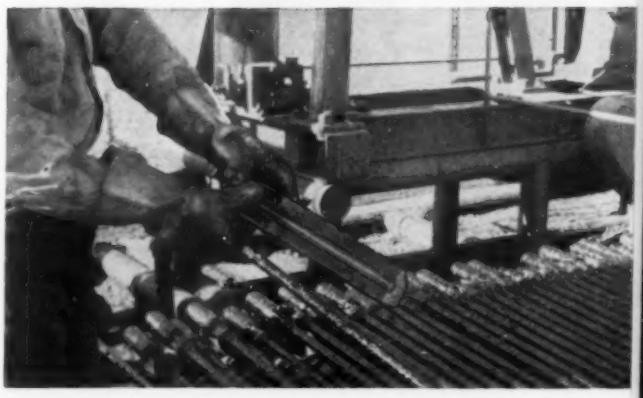
why chlorine-free SOLVO is important to producer and refiner

The organic chlorides found in most chemical paraffin removers remain in the crude—following it to the refinery where they adversely affect the performance of the catalysts used in catalytic reforming. Refinery tests show that as little as 5 gallons of paraffin "solvent" of this kind can contaminate as much as 30,000 barrels of crude, and affect the over-all refinery operation. *SOLVO contains no components which will adversely affect refinery operations.*

how SOLVO is used

SOLVO is available in a variety of formulas; most of which are dispersible in both oil and water, and may be used in either type of diluent. Such dispersions may be relatively concentrated or as dilute as 1%. SOLVO has a high flash point and low vapor pressure, making it safe to use.



Paraffin accumulations such as these plug wells and flow lines, and rob operations of top dollar-efficiency. *SOLVO* has been designed to *prevent* such deposition and eliminate the necessity for frequent pulling and steaming jobs!

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Whether your paraffin problem is in a pumping well, tank or flowline, SOLVO works quickly, efficiently, inexpensively. Your local Tretolite Service Engineer is ready to show you how to get the most successful results from this and any other Tretolite product.

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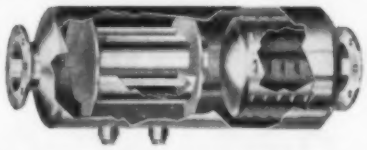

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Trenching Machine Offers New Features

Two types of digging teeth are available for this Model M Ditch Witch trencher—cup-cutters and chisels. They permit efficient digging under all conditions. Other new trenchers features are: (1) a 9.2-hp. AENL Wisconsin air-cooled engine, (2) larger wheels for better traction, and (3) a quick-adjusting clutch link to adjust for drive-belt stretch to keep the trencher performing at high efficiency.

Optional features available are: (1) dual wheels for both drive wheels and the front wheels for increased flotation and traction where necessary, and (2) a master clutch for roading the machine with the digging chain stopped.

The trencher is offered for a 4-ft. maximum depth and a 6-in. maximum width trench. **Write or call: Charles Machine Works, Inc., 671 Birch Street, Perry, Okla., for details on Model M trencher.**

•

Bellows-Type Flowmeter Offers High Accuracy

At static pressures up to 2,500 psi. the flowmeter is accurate to within ½ per cent. And it maintains this accuracy even when ambient temperature changes by as much as 100° F. and static pressure reaches 2,500 psi., the maker reports. The flowmeter is used in conjunction with mechanical recording, indicating, transmission, and control instruments.

Differential pressure is applied to the bellows unit through high and low-pressure connections. As differential pressure changes, liquid in the bellows moves from the high to the low-pressure side, or vice versa. This changes the tension of the range spring and moves the bellows connecting rod, repositioning a torque-tube arm. The torque-tube shaft is so connected to the transmitter that a change in differential pressure changes transmitter output.

Range of the flowmeter is easily changed in the field by springs available in 15 different ranges between 0-120 and 0-400 in. water. Other features of the flowmeter include: (1) a linear damping adjustment, and (2) and easily accessible external suppression adjustment for use when the meter body measures liquid level in closed tanks. **Write or call: Minneapolis-Honeywell Regular Co., Industrial Div., Wayne and Windrim Avenues, Philadelphia 55, for details on bellows type of flowmeter.**

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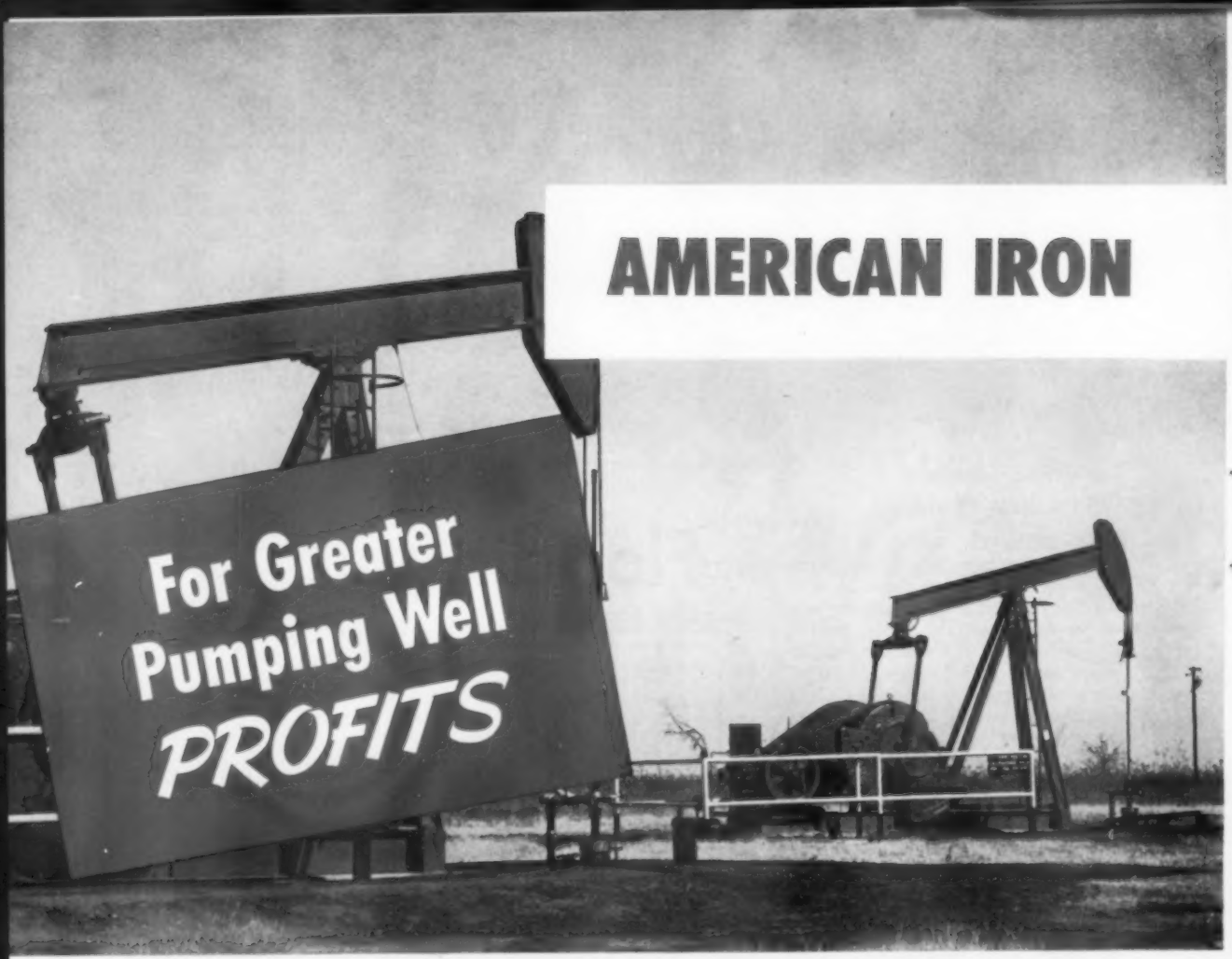


Your Pumping Wells Become More Profitable when you install the AMERICAN IRON *NEW* TENSION TUBING ANCHOR

Completely Retrievable Under All Conditions:

Under normal conditions, just re-jay and pull. Tubing anchor will retrieve easily. Under adverse conditions, a steady upward pull on the tubing will cause a tensile failure of the relief groove in the slip mandrel extension. The upper portion of the slip mandrel extension then becomes a jar that strikes the inside shoulder at the upper end of the housing. The slips are pulled away from the cone and the tool can be retrieved.

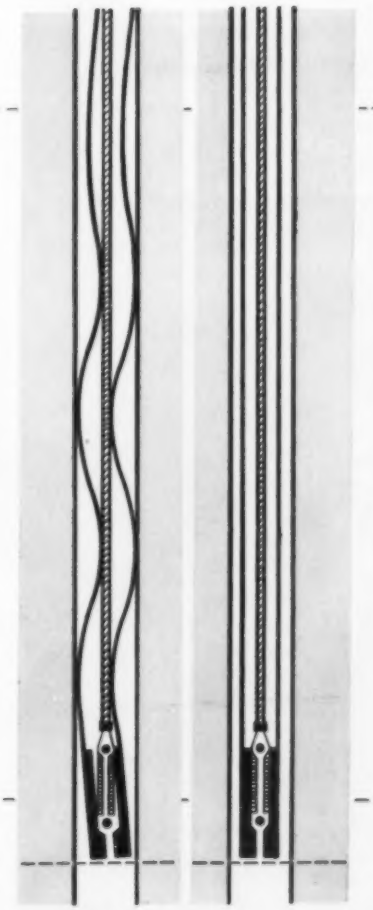
MONEY-SAVING ADVANTAGES listed below show how the American Iron new tubing anchor helps you get maximum pumping well profits!

- **Increases service-life of rods and tubing!**
- **Increases fatigue-life of tubing!**
- **Increases efficiency of the pump!**
- **Decreases tubing connection wear!**
- **Decreases rod-on-tubing wear!**
- **Decreases horsepower input requirements!**
- **May be used as Automatic Tension Tubing Anchor, Positive Tension Tubing Anchor!**

35 YEARS' EXPERIENCE ENABLES AMERICAN IRON & MACHINE WORKS CO.

NEW TENSION TUBING ANCHOR

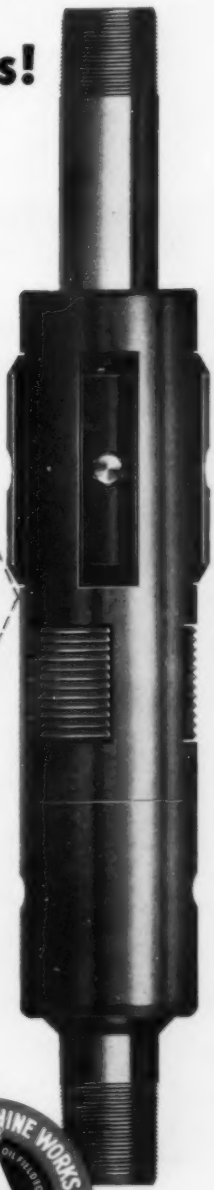
prevents costly sucker rod and tubing failures!



(left)—FREELY SUSPENDED TUBING buckles on the upstroke and *(right)* straightens on the down stroke.

IN PUMPING WELLS, the costly buckling, breathing and cork-screwing of tubing can now be prevented by keeping pumping strings in tension with the American Iron Tension Tubing Anchor. Once this tubing anchor is set, all movement of the tubing, either upward or downward, is eliminated!

FREELY SUSPENDED TUBING buckles on the upstroke . . . and straightens on the downstroke. This damaging cycle can now be prevented by the use of the new American Iron Tension Tubing Anchor—created through American Iron research and design . . . and manufactured under American Iron high quality control standards.



Get all the details now—from your Supply Store or your American Iron representative . . . get the facts that will lead you to greater pumping well profits!

Contact your Supply Store now!

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TO PROVIDE YOU WITH THE FINEST OF DRILLING AND PRODUCTION TOOLS!

Detector Accurately Spots Lost-Circulation Zone

By pinpointing thief zone to within 1 ft. of its location, this detector eliminates the pumping away of costly drilling fluids, according to the maker. The detector reportedly has shown that, though lost circulation often occurs at the point of bit penetration, it also occurs at some distance above the drilling depth—as much as several thousand feet. Also, it has shown that loss occurs at the base of surface or intermediate casing.

The time required to locate a thief zone varies with depth. Usually, however, it takes only about an hour, exclusive of set-up time. Operated on a logging cable, the detector is a thin-walled cylinder with a 4½-in. i.d. Large vents at the top of the cylinder admit drilling fluid. The bottom of the cylinder is open through a 1½-in. swedge. In the center of the instrument is a window. It consists of slits cut through the cylinder wall. Stretched across the inside of the window is a rubber diaphragm which moves in or out, depending on the pressure difference.

An electrode in the center of the diaphragm moves between two fixed electrodes. Electricity flows between the fixed electrodes. Voltage on the diaphragm electrode is recorded at the surface. This voltage varies with the position of the electrode and indicates movement of fluid through the detector. The lost-circulation detector will operate in any type of drilling fluid, if it is electrically conductive. **Write or call: Schlumberger Well Surveying Corp., P.O. Box 2175, Houston, for details on lost-circulation detector.**

●

Swivel Is Suited for Slim-Hole, Shallow Drilling

It's built for drilling depths of 1,000 to 3,000 ft. Besides slim-hole and shallow drilling, the National J-13 swivel is designed for use in exploratory drilling or on workover jobs. Its comparative dead-load rating is 60 tons. Its over-all length is 4 ft., and its net weight is 535 lb.

Design features and specifications of the J-13 swivel correspond closely to the six National Type N swivels which have compartive dead-load ratings of 110 to 500 tons. The 9⅝-in.-diameter main bearing in the J-13 is the modified type of bearing used in all National swivels.

The wash-pipe assembly has four inverted packing rings which effectively seal on the wash pipe and keep the mud from settling on the lips of the rings, the maker reports. Adequate wash-pipe lubrication is assured by a grease fitting. Replacement of either the bail or bail pins in the field is easy and does not require special tools. **Write or call: National Supply Co., 2 Gateway Center, Pittsburgh, for details on J-13 swivel.**

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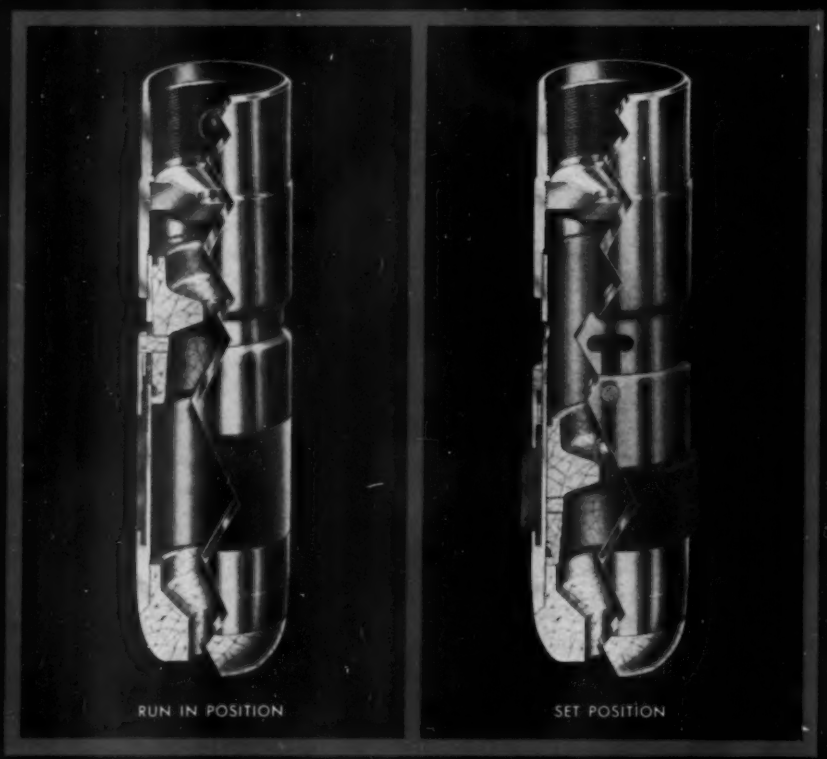

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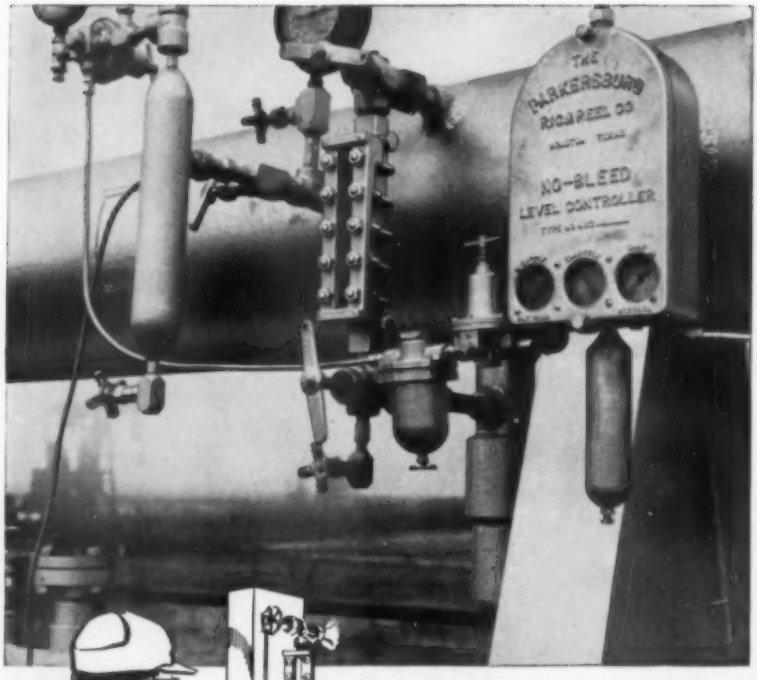

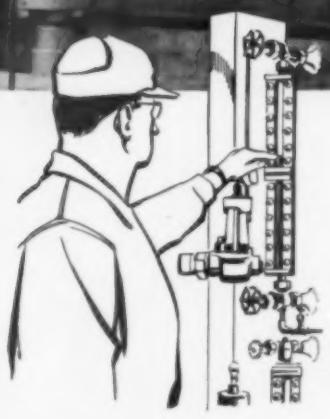

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Outside View of the Inside Story

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With UNOBSTRUCTED VISIBILITY at temperatures from sub-zero to over 750° F.... at pressures exceeding 10,000 psi... Penberthy gages assure more accurate process control — increase protection to vital installations.

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- LIQUID LEVEL GAGES
- GAGE VALVES
- SUMP PUMPS

SHOWCASE . . .

New Literature

Spiral-Wound Metal Gaskets are described in new Bulletin AD-104. The 12-page bulletin details the outstanding features and design factors of the metal gaskets as well as the types available for specific applications. The gaskets consist of spiral-wound strips of V-shaped preformed stainless or cold-rolled steel, alternated with layers of asbestos or Teflon. They are recommended for use with steam, oils, gases, and liquids, including most chemicals in high-pressure, high-temperature applications. The bulletin lists sizes of round, oval, square, flat side, diamond, and pear-shaped gaskets. It includes charts for suggested sizes in relation to the pressures sealed. **Write or call: Garlock Packing Co., 415 Main Street, Palmyra, N. Y., for Bulletin AD-104.**

●

Electric Armored Heaters operating at temperatures of 840° and 1,470° F. are described in a new four-page bulletin. It gives data on heater uses with metal vessels and pipes and for construction and loading. The heaters have a high rate of heat transfer, the maker reports. They may be wrapped directly on metal vessels and pipes. Their flexible, braided nickel-alloy sheaths resist abrasion. **Write or call: Arthur S. LaPine & Co., 6001 South Knox Avenue, Chicago 29, for electro-thermal armored heaters bulletin.**

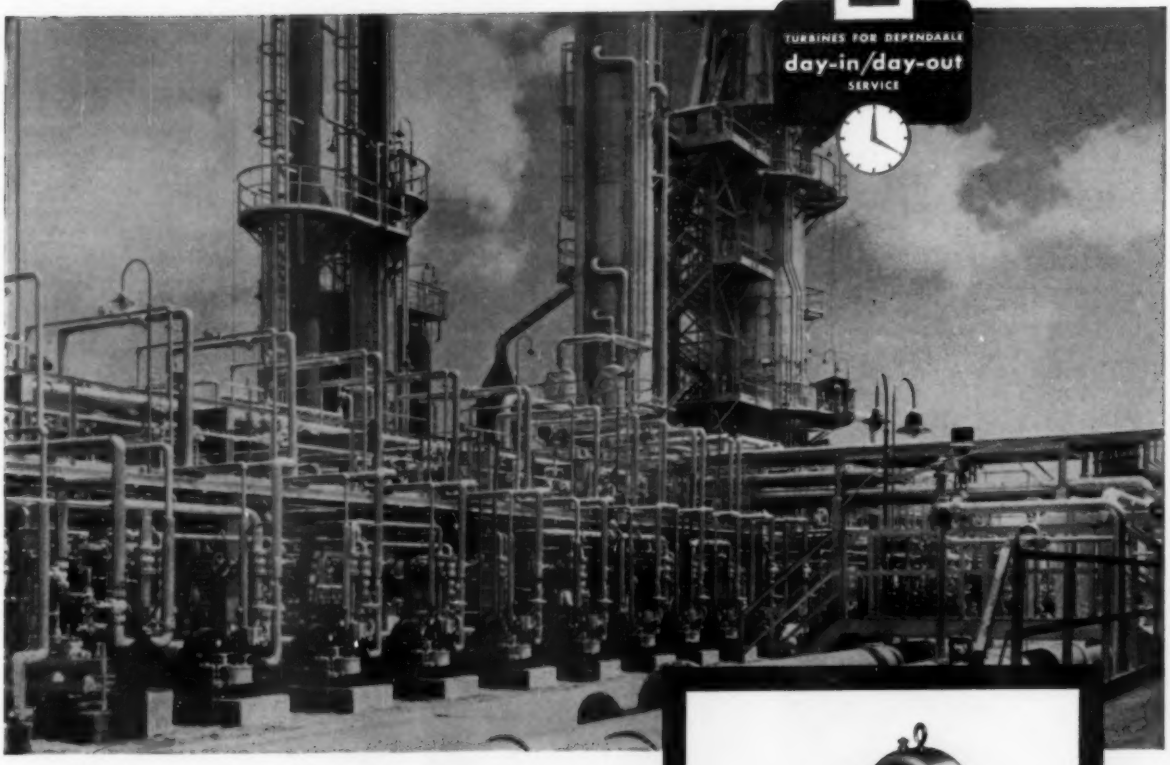
●

Totally-Protected a.c. Motors in sizes of 1 through 125 hp. are discussed in new four-page two-color Bulletin B-2506. Photos, drawings, and easy-to-read text explain total protection and its importance to motor performance. Also graphically described are new NEMA large-frame a.c. motors and their modifications. **Write or call: Reliance Electric & Engineering Co., 2471 Euclid Avenue, Cleveland 17, for Bulletin B-2506.**

●

Butadiene—a major raw material for synthetic rubber—is discussed in a new 52-page technical manual. The manual contains specifications, physical and chemical properties, lists 150 chemical reactions, extensive indices on fields of end uses, reactants and reaction products, and information on samples for experimentation. The bibliography contains more than 300 references.

A 26-page section demonstrates the



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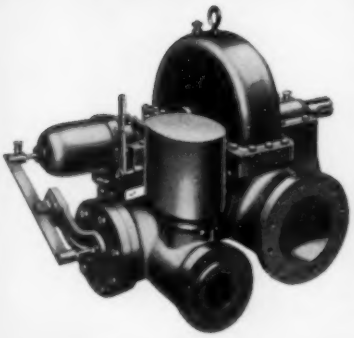
When it comes to prime movers for process and water pumps, fans or compressors, Elliott mechanical drive turbines are the simple and reliable solution. Elliott single-stage turbines, ranging in size from 2 to 600 hp, are specifically designed to provide highest quality and long-term continuous service. In the cat cracker above, a southwestern refinery, 75 Elliott turbines furnish dependable driving power—24 hours a day.

The Elliott YR turbine design also permits easy inspection, simple replacement of wearing parts, and interchangeable components from one turbine frame to another. What's more,, your local Elliott field engineer is always available for application engineering or for operating or maintenance assistance. Call today, or write Elliott Company, Steam Turbine Division, Jeannette, Pa. Ask for Bulletin H-22B.



6 design features you get with ELLIOTT YR single-stage turbines

- True Centerline Support for precise alignment, cold or hot, simplifies installation.
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- Accessible Shaft Seals. Covers—not part of turbine casing—are easily removed for inspection or ring replacement.
- Self-Locating Rotor drops into position without adjustments. Entire rotor is dynamically balanced.
- Interchangeable Components permit interchanging of parts between turbine frame sizes, eliminates need for large inventories.

H7-1

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When you need fabricated vessels and process equipment, Chicago Steel Tank Company, with its facilities, know-how, and experience, can meet your most rigid requirements and code specifications. Call a C.S.T. sales engineer today.
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versatility of butadiene as a basic raw material. It includes more than 150 reactions covering Diels-Alder condensations, addition, oxidation, substitution, and Oxo reactions. The final section gives over 70 end uses. It is crossindexed to show reaction products of commercial interest. **Write or call: Texas-U. S. Chemical Co., 260 Madison Avenue, New York 16, for Butadiene manual.**

●

Indulin Technical Bulletin 100 gives information on the use of the product as a surfactant, extender, dispersant, reinforcement agent binder, sequestering agent, emulsifier, emulsion stabilizer, and protective colloid. Complete with illustrations, charts, and tables, the 20-page brochure details Indulin's usage as a stabilizer for asphalt emulsions and as a selective plugging agent for water flooding in secondary oil recovery. The properties of Indulin in aqueous and in solvent systems are illustrated with charts and tables. **Write or call: Polychemicals Div., West Virginia Pulp & Paper Co., Charleston, S. C., for Indulin Technical Bulletin 100.**

●

Thin-Film Processing Techniques and Application with a mechanically aided thermal processor are reviewed in a new 24-page catalog. The first section reviews the basic principles and techniques of thin-film processing. Illustrated with graphs depicting physical properties and characteristics of viscous liquids, this section also includes flow sheets of Turba-Film processor applications involving concentration, deaeration, distillation, stripping, deodorization, evaporation, desolventization, and homogenization. The middle section of the catalog outlines the Turba-Film Mark II processor, with details of refinements and improvements plus design, engineering, and operating data. **Write or call: Rodney Hunt Machine Co., Orange, Mass., for Turba-Film Processor catalog.**

●

Precision Instruments for measuring, indicating, recording, and controlling the rate of flow of all types of fluids are discussed in new Bulletin M-1. The condensed four-page bulletin gives helpful information on Rotameters, including general-purpose glass-types, armored types for measuring hazardous fluids or fluids under abnormally high pressures, bypass and T-types for measuring large flows, and transmitting types for remote indictating, recording, or controlling

When the Southern California Gas Company planned the Ducommun St., Compressor Station, they anticipated a bad neighborhood relation situation, not to mention an intolerable internal noise condition, unless something was done about quieting the engine compressors.

Logically the problem was turned over to the Burgess-Manning Company . . . specialists in noise elimination. After a scientific analysis of the situation they recommended, designed and built especially engineered Burgess-Manning Air Intake Cleaner Silencers and Burgess-Manning Exhaust Snubbers for each of the eight Ingersoll-Rand Gas Compressors.

In addition, special Burgess-Manning Pulsation Snubbers were installed in the second stage discharge of the compressors to eliminate gas pulsation in the line. As a result, the Ducommun St. Plant is one of the quietest of its type anywhere, an asset to its community and a pleasure to work in. The elimination of pulsation will keep maintenance costs at a minimum.

Successful installations of this kind are possible because of the years of research, study and experiment in the cause and effect of noise that preceded them. Burgess-Manning Engineers are specialists in the elimination of exhaust and intake noise and the pipe line vibration that pyramids maintenance costs.

When such a problem arises in your plant or projected installations, consult Burgess-Manning for a successful, economical solution. They can engineer excessive noise and vibration right out of your equipment and make a "Good Neighbor" out of your plant too!

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SAND SEALED-OFF PUMPS
Figs. 600-800-900

Inverted Combination Single or Double Plunger Self-Aligning Pumps can be equipped with a Sand Flush Valve which seals the Plunger off on top and cleans the barrel every pump stroke.

Sand is deposited into blind cage above the plunger and is discharged every stroke of the pump. The bottom of plunger is sealed to eliminate slippage. Easy on surface equipment. Lower lifting cost with Sealed-Off Pumps.

Can be run in any API seating device or use an adapter to fit the seating device preferred. We carry in stock at all times Special Heavy Duty Sand Housing Mechanical Seating Shoes which are very important to bad sand conditions—a place for sand to settle, so when pump is on down stroke, the bottom barrel bushing with a double spiral spray reaches into the sand housing, moving the sand upward and out of the tubing with the oil.

COMBINATION ROD GUIDE AND PARAFFINE SCRAPER

This exclusive Thompson device eliminates wear on rods and pump. Insures proper alignment and removal of paraffine ahead of pump. Allows pump to pull freely. Standard equipment with many operators.

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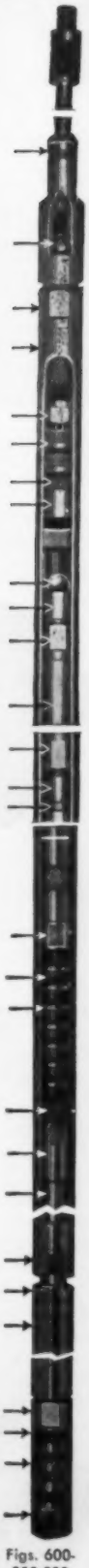

Figs. 600-800-900

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Alco Completes This Warehouse-Office Building . .

which will serve the West Texas-New Mexico region. Complete testing and repair service will be available to the area.

The new facilities are 5 miles east of Odessa. Area manager for West Texas and New Mexico is O. C. Sloan, who has been with Alco Products, Inc., 7 years. Warehouseman is Leroy Pope. Sales representative for the area is Bill Rogers.

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(Continued on page 342)

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San Angelo

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El Campo
Falfurrias
Houston
Refugio
Victoria

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Borger
Pampa

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Kermit
Lubbock*
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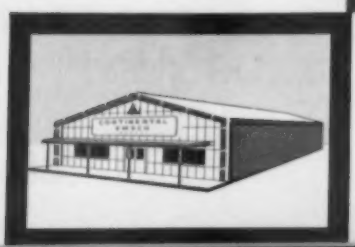

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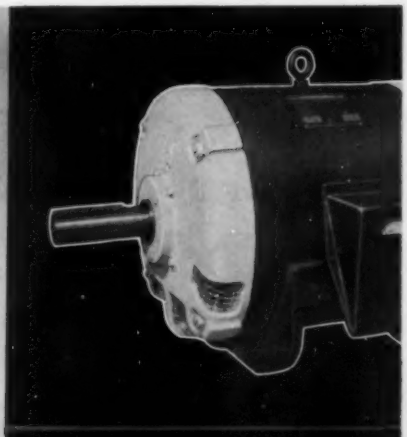

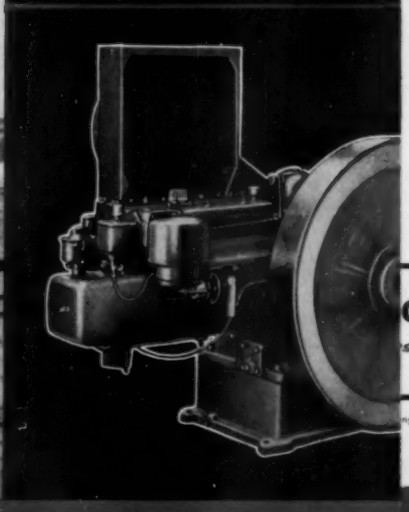

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Lift Page
for Subsurface
Equipment

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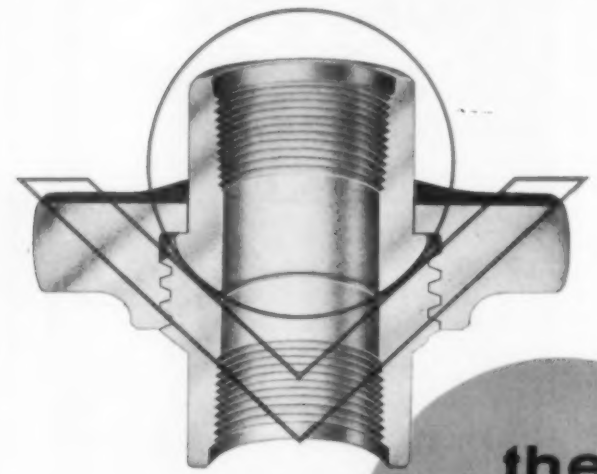
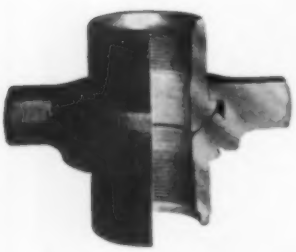
with WECO UNIONS





the SECRET'S in the SEAL

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BRITISH COLUMBIA
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Fort St. John

MANITOBA
Virden

SASKATCHEWAN
Estevan
Lloydminster

VENEZUELA

Anaco
Caracas*
Las Morochas
Maracaibo

UNITED STATES

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Coalinga

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NORTH and WEST CENTRAL TEXAS
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SOUTHWEST TEXAS
San Angelo

TEXAS GULF COAST
Corpus Christi
El Campo
Falfurrias
Houston
Refugio
Victoria

TEXAS PANHANDLE
Amarillo*
Borger
Pampa

WEST TEXAS
Andrews
Hadacol Corners
Kermit
Lubbock*
McCamey
Midland*
Monahans
Odessa
Post
Snyder
Sundown

Rocky Mountain States

COLORADO
Artesia
Denver*
Sterling

MONTANA
Billings*
Cut Bank
Glendive

NEBRASKA
Kimball

NEW MEXICO
Farmington
Hobbs
Tatum

NORTH DAKOTA
Williston

WYOMING
Casper
Cody
Newcastle

Tri-State Area

ILLINOIS
Chicago*
Salem

INDIANA
Evansville*
New Harmony

KENTUCKY
Henderson

* Office only. No stock at these points.

for complete production harmony

GO CONTINENTAL-EMSCO worldwide

TYPE 5
Heavy Duty • Medium

There's a

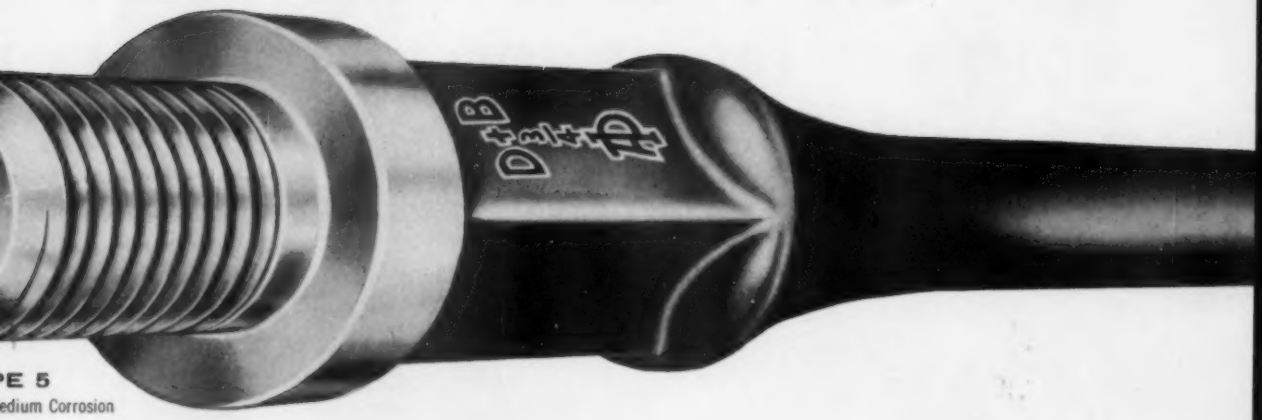
D+B SUBSURFACE PUMI

to fit every well conditio

Continental-Emsco *MAKES, SELLS* and *SERVICES* D+B pumps . . pumps that stay longer on production, even und the most severe field conditions . . lift more fluid at less cost D+B pumps are more API than all others and are put together in the most modern pump sho in the world . . by men who know pump best. They're available in a complete range of sizes . . 37 types with over 700 variations.

..Service t

QUALITY-BUILT TO S



PE 5
edium Corrosion

MP
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LS
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RELIANCE
Heavy-Duty • Heavy Corrosion

HI-TEN
Heavy Loads • Heavy Corrosion

HEATREAT #1 C M
Medium Duty • Minimum Corrosion

You can't buy a better sucker rod than D+B

D+B sucker rods are *MADE* and *SOLD* and *SERVICED* by Continental-Emsco. There are four grades to meet every pumping need . . from light through heavy corrosive conditions . . made extra tough with extra strength for extra long trouble-free runs. They're *priced right* . . always available *faster* because Continental-Emsco's service is *world-wide, specialized, complete.*

D+B DUAL-PAC STUFFING BOX permits re-packing without killing the well.

D+B QUIK-GRIP CLAMPS eliminate "knuckle-busting"—designed for one-man installation.

D+B API POLISHED RODS made from carefully selected materials in 5 types to meet every well condition.

that Sings..

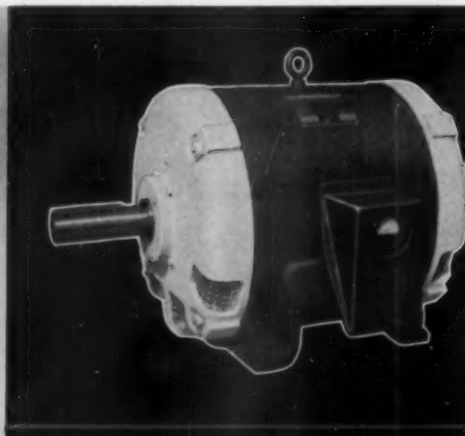
STOP PROBLEMS BEFORE THEY START

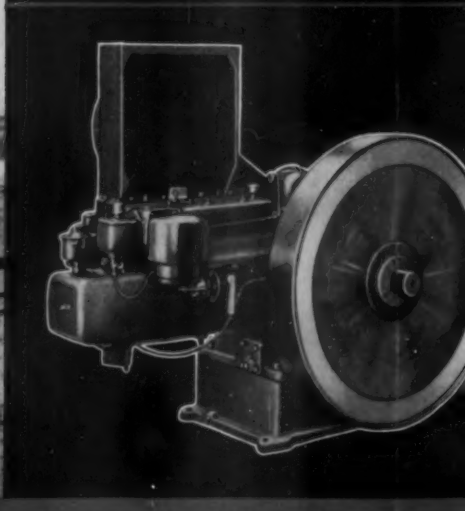
PUMP ELECTRICALLY ***or with GA***

CONTINENTAL-EMSCO MATCHED EC

designed exclusively for oil field pumping

operates with maximum efficiency.. maximum econ





Equipment

Lift Page
for Subsurface
Equipment

ENGINEERED . . N

GAS
EQUIPMENT

To help you take *full advantage* of the cheapest power available . . electricity or gas . . Continental-Emsco has developed the C-E Green Triangle Electric Pumping Motor and C-E Pumping Engine . . both *strictly oil field* from the base up.

conomy

C-E GREEN TRIANGLE ELECTRIC PUMPING MOTORS

This is the first electric motor designed exclusively for oil field pumping. Typical of its *oil field* design is a built-in balance meter. Here a needle shows at a glance if the well is pumping satisfactorily or if there's trouble in the well . . a parted rod string . . an unseated pump . . paraffin deposits . . or some other problem. It gives an accurate gauge for balancing the well, too. A pumper can check the balance meter easily . . quickly; an engineer with a special electrical instrument is not needed.

Double extended drive shaft gives the motor maximum flexibility of application, and an oversized conduit box makes hooking-up easy.

Its special oil field design provides 5-8% slip, 275% starting torque with a 1.15 service factor and 40°C rise to give cushioned peak demands and added protection to gears . . belts . . bearings . . well equipment. Sizes from 3 through 30 horsepower are available.

CONTINENTAL-EMSCO C-E PUMPING ENGINES

steady power that pumps on and on

Built and engineered for dependable, sure operation wherever you're pumping oil . . whether it's pouring rain or blowing sand . . bitter cold or burning hot, you'll get steady, smooth, sure power with a C-E engine. It starts quickly, at the first spark, easily and safely . . can't kick back. It *services easily* . . no need to shut down to check or add oil or water. It *repairs without complete disassembly* . . unit assembly allows accessibility to all parts. Over 17,000 in service . . all engaged in pumping oil.

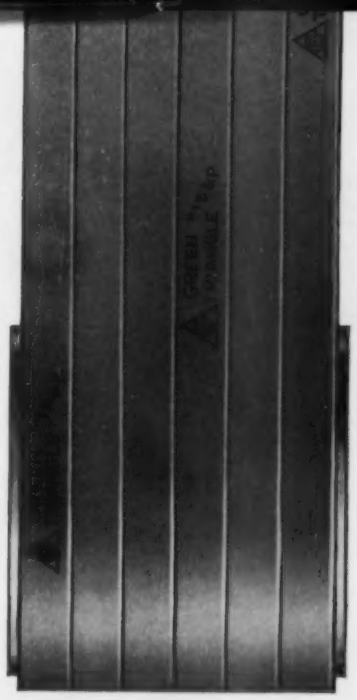
CONTINENTAL-EMSCO UNIT PUMPERS

where efficient performance counts!

Not just built . . but *engineered* for smooth, sure operation, for rugged endurance. Counterbalances are *one-man adjustable* . . in three easy, safe steps . . *all at ground level.* Anti-friction bearings throughout . . precision-cut herringbone gears with rigid case . . automatic lubrication at all speeds, with labyrinth type oil seals that can never wear out. Here's the unit pumper engineered for long, dependable operation with minimum upkeep. Available in a wide variety of sizes and modifications for heavy, medium and light loads.

t that Hums

NOT JUST BUILT



GREEN TRIANGLE V-BELTS

In oil field-tough matched sets

Green Triangle V-Belts are engineered, manufactured and marketed exclusively for oil field use.. made by the New York Belting and Packing Company, most experienced producers of industrial rubber goods in America.

Green Triangle V-Belts are carried in stock in packaged matched sets by your Continental-Emsco store. Whether for hook-up or replacement, the belts you need are always readily available. Continental-Emsco not only has the most complete line of V-Belts in the industry.. but the most complete service set-up.. world-wide.

Look in on our pump shop

for D+B PUMPS, PARTS and SERVICE

Drop by your Continental-Emsco store, next time you're in town, and let us show you our D+B Pump Shop. We'd like you to know, first-hand, the kind of service and parts set-up we have for you. You'll find a full line of the kind of pumps used in your area.. a complete supply of parts.

You'll want to look over the special equipment we use to overhaul, rebuild and pressure-test all kinds of pumps. While you're there, take note of the way our cars, pick-ups and trailers are equipped to haul your pumps.

Talk to the pump shop foreman.. you'll get some new ideas about fast, thorough pump service. Check with the Continental-Emsco man, a D+B pump specialist, about your well problems.

All are yours.. when and where you need it.

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

CONTINENTAL-EMSCO COMPANY • A Division of The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas • Export Division: 45 Rockefeller Plaza, New York, N. Y.
Continental-Emsco Company Limited • General Offices: Calgary, Alberta, Canada
Continental-Emsco Company C.A., Caracas, Venezuela • Plants: Los Angeles • Houston • Garland, Texas • Representatives in All Principal Oil Fields of the World

..Go CONTINENTAL-EMSCO

Extend the life of your V-Belts. Read the helpful hints in this manual for selecting and using V-Belts. Ask the Continental-Emsco man for your copy.

P724R

EQUIPMENT MEN

(Continued from page 335)

Ideco, Inc., Named Kelco Export Representative . .

for catheads and other products. According to Ben F. Kelley, chairman of the board of Ben F. Kelley Co., Inc., Tulsa, and George W. Walton, president of Ideco, sales and service of Kelco spinning and breakout catheads, air-operated slips, and Fulgrip tongs will be handled by Ideco. No change will be made in Kelco representation in the U. S. and Canada.

Through its affiliates, Dresser A. G. and Dresser International, Inc., Ideco has agents and service representatives in active oil areas in the free world. A one-package export service at its Beaumont, Tex., plant combines complete purchasing, equipping, rigup, testing, crating and shipping services for all types of petroleum equipment and supplies for export.

Industrial Supply Opens Oklahoma City Office . .

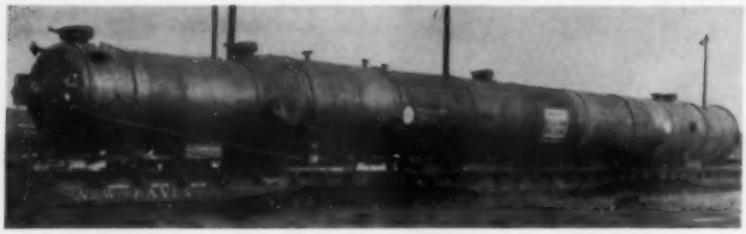
with Ray J. Hall as resident manager. According to Jerry Vinson, president of Industrial Supply Co., Wichita Falls, Tex., the new sales office is in the First National Bank Building.

Hall has had 21 years' experience in the oil field supply business of which the past 11 years have been in Oklahoma City.

Foreign Representative Visits M. J. Crose . .

to discuss pipeline construction equipment. Otto Steinfellner (left) talks with John Manley, export sales manager for M. J. Crose Manufacturing Co., Inc., (center) and sales engineer Estille Sherrill.

Steinfellner's company, Technica, represents United States firms in Germany and Switzerland, with offices in Dusseldorf and Munich. He toured oil fields with Crose personnel for firsthand study of equipment in operation before returning to Germany.



Delta Tank Sends Giant Tower to Texas . .

to be erected at a large petrochemical plant. The 120-ft. deethanizer tower was built by Delta Tank Manufacturing Co., Inc., at Baton Rouge and engineered and erected by The M. W. Kellogg Co. It weighs 170,000 lb., has an interior diameter ranging from 78 to 96 in. and contains 40 processing trays.

Walter H. Cox Advanced By Hercules Tool Co. . .

W. H. COX

to sales masnager. This will relieve L. C. (Dusty) Rhoads, vice president and former sales manager, of sales manager functions he has performed since his appointment to vice president 2 years ago. Cox's promotion will enable Rhoads to devote more of his time to the supervision of product design and development, manufacturing, and other duties of general management.

Cox joined Hercules Tool in 1955 as city salesman, calling on the oil and supply company offices in Tulsa, Oklahoma City, and Bartlesville. Since late in 1956 he has been special representative on various assignments in addition to city sales. Prior to joining Hercules, he served with Oil Well Supply, Kerotest Valve Co., and L. C. Moore Co.

Oil Well Supply Appoints In Gulf Coast Area . .

at Houston and New Iberia, La., Lawrence C. Armstrong, Jr., has been named area manager, engine and compressor sales, at Houston, according to M. F. Jones, Gulf Coast area manager. Berl T. Stark has been appointed manager of the New Iberia store of United States Steel Corp.'s Oil Well Supply Division.

Armstrong joined Oilwell in 1953 as quotation and pricing specialist at Oil City, Pa., and was transferred to Garland, Tex., in 1955. Stark joined Oilwell at Houston in 1948. After leaving the division in 1952, he rejoined it in July 1957 as field representative at Houma, La., the post he held prior to his recent appointment.

Chiksan Promotes Three

L. J. SMITH

Louis J. Smith has been appointed vice president and sales manager of Chiksan Co. and Chiksan of Canada, Ltd., and Edward T. Landgraff has been made vice president and sales manager of Chiksan Export Co., according to H. J. Hagn, president. Replacing Smith as eastern regional sales manager is John F. Powers, Jr., formerly senior field engineer.

E. T. LANDGRAFF

J. F. POWERS, JR.

Smith, who joined Chiksan in 1948, has been eastern regional sales manager since 1951. He will headquarter at the firm's main office and plant in Brea, Calif. Landgraff has been with Chiksan since 1946 and has been export sales manager since 1954. He will continue to headquarter at the Newark, N. J., office.

The changes in Chiksan's sales department resulted from the resignation of G. R. Winder as vice president and general sales manager of Chiksan and its two subsidiary companies.

Solar Aircraft Co. Names Roy M. Horlock . .

sales engineer for expansion joints and other industrial products. From headquarters in Houston, he will serve customers in Texas, Louisiana, Mis-

With Magcobar on your well ...

a bonus in engineering experience to cut your drilling costs

The Magcobar service engineer and the district engineer make certain that you are getting all the cost reducing advantages of a sound mud program. These two work as a team to see that you get the right products backed up by sound mud engineering.

The district engineer can speak with authority when working with you to plan a mud program. And this authority is grounded on long familiarity with the district and the knowledge of past well problems. His experience shows up in the most economical drilling program for your well.

You can expect from him the latest word on the newest developments from Magcobar. He is constantly studying the application of Magcobar products and of new techniques to district drilling problems. This information is yours for the asking.

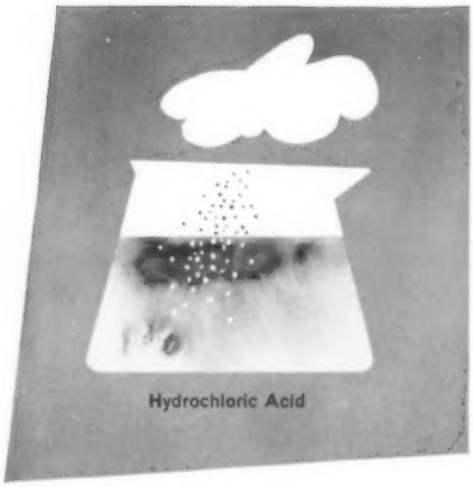
The Magcobar district engineer is always on the go. One eye is kept on all the wells in his district; the other, on new techniques and new products being developed by Magcobar. Make certain that you get this extra bonus in engineering know-how on your next wells. Begin to plan with Magcobar now.

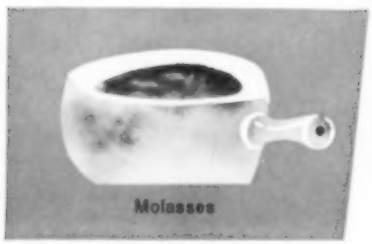
Magnet Cove Barium Corporation
Houston, Texas

Magcobar
Complete
DRILLING MUD SERVICE

58—101

which of these
can't be stored in a
GENERAL AMERICAN TERMINAL?





answer! General American can store them all! (and does!)

Six "problem" products! Yet each can be stored safely and economically at General American Tank Storage Terminals.

Whether your product is as volatile as methylene chloride, as corrosive as caustic soda or as viscous as molasses, General American can supply the storage facilities for your needs.

General American Tank Storage Terminals offer you the privacy, safety, service and flexibility of your own terminal—*without capital investment on your part.* Write or phone—today. You'll find... *it pays to plan with General American.*

Six terminals at 5 key-market locations with over 14,000,000 barrels capacity: PORT OF NEW YORK (Carteret, N.J.), PORT OF NEW ORLEANS (Good Hope, La.), CHICAGO, ILLINOIS (Bedford Park), PORT OF HOUSTON (Galena Park and Pasadena), CORPUS CHRISTI, TEXAS.

GENERAL AMERICAN TANK STORAGE TERMINALS

a division of GENERAL AMERICAN TRANSPORTATION CORP. *135 South La Salle Street • Chicago 90, Illinois*

TANK STORAGE TERMINALS GENERAL AMERICAN TRADE MARK

missippi and Oklahoma, according to R. W. Bourne, manager, industrial products sales.

Before joining Solar, Horlock was supervisor of piping design for Fluor Corp., Ltd., and prior to that was vessel and piping designer for F. S. West Co., both of Houston.

Perkin-Elmer Corp. Names Van Zandt Williams . .

DR. WILLIAMS

executive vice president, according to Richard S. Perkin, president.

Dr. Williams joined the company in 1943 as director of instrument development and sales. In 1951 he was elected a vice president and director of the corporation and director of sales and research. He became general manager of the company's newly formed instrument division in 1956 and held this position until his recent appointment. Before joining Perkin-Elmer, Williams was with American Cyanamid Co. at its Stamford, Conn., research laboratories.

Burgess-Manning Division Moves to New Plant . .

in the new Brookhollow industrial district of Dallas.

This move gives the industrial silencer division of Burgess-Manning Co. improved operating facilities and includes a development laboratory in which studies can be made of field problems relating to noise, flow of gas in pipes and liquid separation.

Tretolite Co. of Calif. Names Louis T. Monson . .

to succeed Glen W. Camblin as vice president of Petrolite Corp. and general manager of its Tretolite Co. of California division. Camblin has retired after more than 33 years of service in the Tretolite organization.

W. J. DICKSON

L. T. MONSON

Both Monson and Camblin joined Tretolite when it was operated as Wm.

grooved pipe connections ?

name the application — gb has the coupling

GRUVAGRIP

Made of rugged malleable iron, Gruvagrip is an easily-installed, reusable coupling for grooved pipe with working pressures up to 1,000 p.s.i. Maintains air-tight connection under misalignment up to 7°. Absorbs shock, vibration, ground motion, expansion and contraction.

GRUVAJOINT

Gruvajoint's low-cost companion for pipe with working pressure up to 500 p.s.i. Air, gases, water, oils, chemicals, processing fluids, pulverized minerals . . . G-B couplings are built for use with pipe carrying virtually any type of liquid or material.

RIGI-GRIP

The NEW G-B coupling for grooved pipe applications where complete rigidity of connection is desired. Rigi-Grip also is designed for pipe with working pressures up to 2,000 p.s.i. Ideal for tank battery hookups, LACT units, production headers and complete waterflood piping systems.

AND, G-B OFFERS YOU A COMPLETE, COMPANION LINE OF DEPENDABLE, FREE-FLOWING FITTINGS

G-B COUPLING PRODUCTS ARE AVAILABLE AT LEADING SUPPLY STORES EVERYWHERE

GUSTIN-BACON Manufacturing Company

210 W. 10th St. Kansas City, Mo.

A TYPE AND SIZE STRUCTURE FOR EVERY DRILLING REQUIREMENT

Lee C. Moore design engineers maintain a constant program of study and research to provide a world-wide oil industry with structures best suited to specific requirements.

CANTILEVER MASTS • TRAILER MOUNTED MASTS
DERRICKS • SUBSTRUCTURES • SAFETY PLATFORMS
STAIRWAYS • RAMPS • PIPE RACKS • ENGINE
FOUNDATIONS • STEEL FLOOR GRATINGS

LEE C. Moore CORPORATION

TULSA : DALLAS : HOUSTON : CENTRALIA : ODESSA
NEW ORLEANS : CASPER : GREAT BEND : PITTSBURGH

EXPORT OFFICE: ROOM 626, INTERNATIONAL BLDG., 630 5TH AVE., NEW YORK 20, NEW YORK
FOREIGN LICENSEE MFR.: OIL WELL ENGINEERING CO., LTD., CHEADLE HEATH, STOCKPORT, ENGLAND

Barnickle & Co., Camblin in 1924 and Monson in 1926.

Replacing Monson as manager of Tretolite's California laboratory is Woodrow J. Dickson, who has been engaged in demulsifier research and development for Tretolite for 20 years.

Cooper-Bessemer Appoints Woodrow W. Waligore . .

W. W. WALIGORE

to the Odessa branch office, according to Grant C. Woodard, general sales manager.

As a sales engineer, Waligore will work under the direction of C. L. McDougall, branch manager. In this capacity he will contact operators on the engineering and application of reciprocating and centrifugal compressors for gas transmission and gas processing.

Before coming to Cooper-Bessemer, Waligore was with Humble Oil & Refining Co. for 10 years.

Graver Becomes Division Of Union Tank Car Co. . .

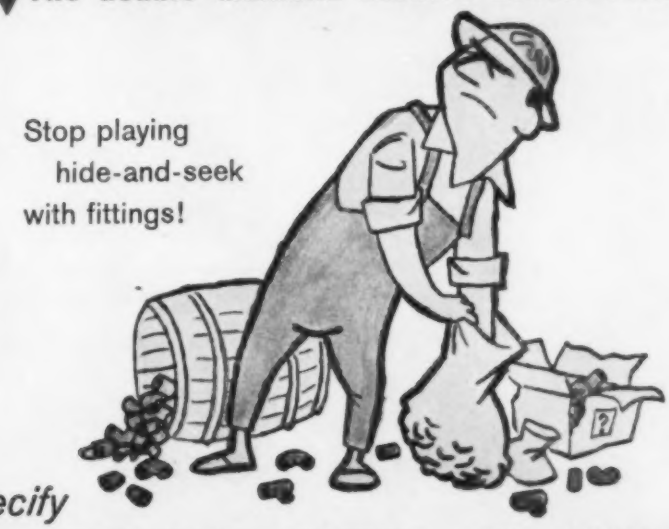
and will operate as an integrated and wholly owned division of that firm.

Graver Water Conditioning Co., headquartered in New York City, was formerly a division of Graver Tank & Manufacturing Co., Inc., East Chicago, Ind., whose assets were recently acquired by Union Tank Car. According to E. A. Locke, Jr., president of Union Tank Car, H. T. Sulcer will continue as vice president and general manager of Graver Water Conditioning, a position he has held for the past 9 years, and V. J. Calise will remain as sales manager.

Reliance Names Four Regional Sales Managers

William K. Schlotterbeck has been named Southwest regional sales manager covering the Houston, Dallas, and St. Louis districts; Charles D. Herbert becomes eastern regional sales manager to cover the Boston, New York and Philadelphia districts; Emory G. Orahood becomes Southeast regional sales manager covering the Atlanta, Charlotte, and Birmingham districts; and R. O. Herbig becomes Central West regional sales manager covering the Chicago and Detroit districts. These appointments were announced by C. V. Gregory,

W-S The double diamond assures double value



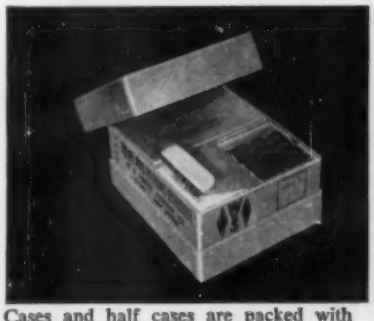
Specify

W-S FORGED STEEL FITTINGS IN IDENTI-FILABLE PACKAGES

Eliminate lost time searching for elusive fittings. Stock your shelves with W-S Forged Steel Fittings in new *identi-filable* packaging. Cartons in three sizes stack neatly and compactly in your storeroom. Exterior markings give prompt identification of contents. The cartons are handy for holding fittings on installation jobs.

The strong, lightweight fiberboard W-S cartons protect your fittings from dust, moisture...and only W-S Forged Steel Fittings have a blue rustproof coating which gives them long-lasting protection. Like all W-S products, they're precision made from highest quality materials.

Forge and Fittings offers a full range of high quality drop forged fittings, unions and couplets...in carbon, stainless and alloy steels. For full information about these products or your miscellaneous drop forged and die casting requirements, write to Forge and Fittings Division, H. K. Porter Company, Inc., P. O. Box 95, Roselle, New Jersey.



Cases and half cases are packed with assortment of carton sizes to your order.

Fiberboard cartons in three sizes make neat, identifiable stacks on your shelves.

H. K. PORTER COMPANY, INC.

FORGE AND FITTINGS DIVISION

W-S Fittings Works, Roselle, N. J. • Cleveland Forge Works, Cleveland 4, Ohio
Stainless Steel Works, Duncannon, Pa. • Cleveland Die Cast Works, Cleveland 4, Ohio

No. 4 advertisement of six proving . . .

why Jones sucker rods last longer

1. *Advanced Research and Development*
2. *Advanced Engineering Experimentation and Control*
3. *Advanced Metallurgy and Heat Treating*
4. ✓ *Advanced Manufacturing and Production*
5. *Advanced Inspection and Testing Techniques*
6. *Advanced Field Engineering and Service*

There is a

The S. M. Jones Company

ADVANCED MANUFACTURING and PRODUCTION METHODS

Each Jones Sucker Rod is precision forged after heating in high-speed furnaces. Heat treatment is carefully controlled, after which bars are descaled and shot peened to increase fatigue resistance.

Threading is done on automatic machines to close limits and A.P.I. standards. Threads are inspected with gauges which are periodically checked against A.P.I. master gauges.

A synthetic baked enamel finish is applied to protect the rods in shipment and storage.

Each coupling is accurately tapped straight through the bore and A.P.I. gauged to assure perfect make-up between coupling and rod. Coupling faces are ground while the coupling is rotating on an A.P.I. threaded arbor. Faces are always ground at right angles to the thread axis. This fine thread and ground face provide joint make-up that will assure linkage stronger than the rod.

JONES QUALITY SUCKER RODS
SINCE 1891

The S. M. Jones Company modern manufacturing plant, Toledo, Ohio

THE S. M. JONES COMPANY

●

Division of Buffalo-Eclipse Corporation

General Office and Factory:
TOLEDO, OHIO
Sales Office: Enterprise Building,
TULSA, OKLAHOMA
Export Sales Representatives:
IDECO, One of the Dresser Industries,
Republic National Bank Building,
Dallas, Texas, and
Chanin Building, New York City

difference in sucker rods

JONES

alloy

SUCKER RODS

TYPE 12

For added strength to lift heavier loads with no increase in rod size.

Made from strong, corrosion resistant nickel chromium molybdenum processed electric furnace steel, fully normalized and drawn; has exceptionally high yield strength and excellent fatigue resistance.

SPECIFY—Jones Sucker Rods for deep wells and all wells . . . for proved longer life.

FOUR TYPES OF JONES SUCKER RODS FROM WHICH TO CHOOSE

Type	Identification	USE	DESCRIPTION	PHYSICAL PROPERTIES					
				Yield 1000 psi	Ultimate 1000 psi	% Elong. in 8"	% Red. of Area	Izod	Brinell Hardness
J-12	Protector ends painted BLUE	For heavy pumping loads under all conditions	Made from processed electric furnace steel with high yield strength and excellent fatigue resistance.	95-105	110-125	12-17	65-75	90-110	220-260
J-8	Protector ends painted BLACK	For extremely heavy pumping loads	A special alloy steel of exceptional yield strength and well-balanced physical properties.	100-115	120-135	10-15	50-60	65-85	240-300
J-7	Protector ends painted ORANGE	For medium to heavy pumping loads under all conditions	Called "standard of the industry". Strong, corrosion resistant nickle molybdenum steel, fully normalized, tempered, descaled and shot peened for further fatigue and corrosion resistance.	65-80	85-100	14-22	60-70	90-107	170-210
J-2	Protector ends painted WHITE	For medium to heavy pumping loads in non-corrosive fluids	High grade carbon manganese steel, fully normalized, descaled and shot peened to add strength and endurance.	60-75	90-105	18-24	60-70	60-80	160-210

Jones Pony Rods carry the same physicals as Jones Sucker Rods. Always use proved superior Jones Pony Rods with proved superior Jones Sucker Rods.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

Here's a new, fast way to pinpoint thief zones

the Schlumberger LOST CIRCULATION DETECTOR

Effective treatment of a thief zone can be accomplished only when you know exactly where that zone is . . . and now you do not have to pump away costly drilling fluid to locate the thief zone.

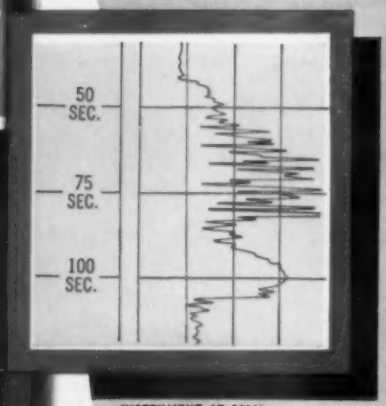
The Schlumberger Lost Circulation Detector can pinpoint any thief zone within one foot.

The Detector has shown that while lost circulation often occurs at the point of bit penetration, it will, in many cases, occur at some distance above the drilling depth; sometimes as much as several thousand feet.

In such cases, you can minimize ineffective and costly treatments if the zone of loss is first correctly identified. Treatment can then be effected at the exact location of the thief, the first time, rather than hundreds of feet up or down the hole.

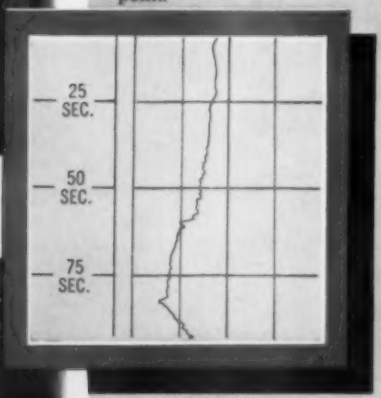
The average lost circulation survey can be accomplished in about one hour.

At the first sign of lost circulation, run the Schlumberger Lost Circulation Detector! It can be a real time and money saver for you. Ask your Schlumberger representative today for the new, descriptive folder which gives complete information on this new tool and its operation.



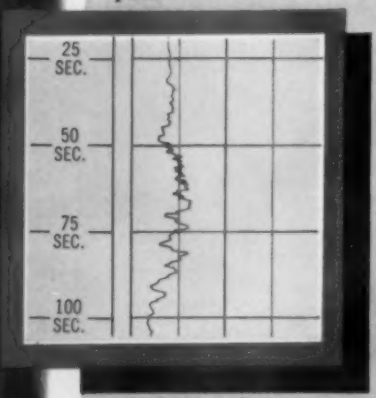
INSTRUMENT AT 9414'

Time graph shows fluid flow through detector . . . thief zone below this point.



INSTRUMENT AT 9420'

Time graph shows no flow through detector . . . thief zone above this point.



INSTRUMENT AT 9417'

Time graph shows slight flow through detector . . . thus, thief zone taking most of the fluid. Detector within one foot of thief zone.

SCHLUMBERGER . . . Engineering for Better Service

sales manager of Reliance Electric & Engineering Co.

James P. Reeves has been appointed transmission product manager, according to W. C. McConnell, manager of the general products division.

Schlotterbeck, who went to Dallas in 1956 as district manager from the same post in Buffalo, originally joined Reliance in 1939. Herbert has been district manager in New York City for over 30 years. Orahood, whose headquarters are in Atlanta, has been manager of the Atlantic district since 1949. Herbig, whose headquarters are in Chicago, joined the firm in 1917. For the past 10 years, he has been the Central Western district manager.

Security Engineering Elevates W. L. Haning . .

to chief engineer He formerly was chief field engineer for the division, one of the Dresser Industries.

W. L. HANING

Haning has spent the past 10 years in the rock-bit business doing field engineering throughout the United States and Canada. His advancement is part of Security's world-wide sales and service expansion program, according to A. M. Birnie, executive vice president in charge of world-wide sales.

Aluminum Tubing Co. Changes Firm Name . .

to Roll-Weld Pipe & Tube, Inc. President Jack G. Neupert states that the new name is more compatible with steel and stainless steel pipe which are being added to the product line. Steel and stainless steel as well as aluminum pipe and tubing will be produced on two new pipe mills in diameters from ½ through 14 in. o.d. in wall thickness from 0.028 through 0.250 in. Commercial production on the new mills is scheduled for early 1958.

The new mills include a McKay electric resistance welder for producing steel line pipe and a newly designed Yoder M-3 tube mill.

Worthington Reorganizes Oil City, Pa., Works . .

which will be known as the Oil City division. William F. Weinreich has been named general manager, according to Walter H. Feldmann, president.

Continuing as manager of sales for mechanical power transmission products is Draper E. Tessendorf. R. Kenneth Grobholz will continue as manager of sales for power pumps.

Weinreich was transferred from the Buffalo, N. Y., plant to Oil City in 1951 and became works manager in 1952. Tessendorf, who joined Worthington in 1933, became manager of Multi-V-Drive products at Buffalo in 1943 and manager of the mechanical power transmission department at Oil City in 1952. Grobholz served as engineer in charge of steam pumps at the Harrison, N. J., plant before being named manager of reciprocating pump sales at Oil City in 1954.

Worthington purchased the Oil City plant in 1951 from National Transit Pump Co.

Pittsburgh Coke Promotes Carpenter to New Post . .

in its coke and iron division. Hiram A. Carpenter has been named to the newly created position of sales manager, coke byproducts, according to the division's general manager, C. T. Marshall.

Carpenter will be responsible for the organization and operation of all sales activities related to coke by-

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products, which include benzol, toluol, xylol, coke breeze and ammonium sulfate.

Joining the company in 1946, Carpenter has risen successively through the positions of assistant manager of purchases and assistant manager of chemical procurement to his present assignment.

First National City Bank Promotes C. R. Dodson . .

to vice president in the petroleum department. Dodson was formerly assistant vice president of the New York City bank.

J. Paul Roston Joins Alex W. McCoy Associates . .

as staff engineer for the petroleum consulting firm. According to Alex W. McCoy, head of the organization, Roston previously was head of the petroleum section in the mining engineering department at the Missouri School of Mines. Prior to that he served with Southwestern Oil & Mineral Corp., University of Texas, and from 1947 to 1952 was a consulting engineer and geologist on oil and mineral properties.

The McCoy firm was founded in 1953. In addition to its Tulsa headquarters, McCoy Associates has offices in Denver, Casper, Wyo., and Calgary, Alta., Canada.

Arthur G. McKee Co. Makes Executive Changes . .

by electing H. R. Moorhouse as executive vice president, according to H. E. Widdell, president. Moorhouse will continue as treasurer.

C. H. Ganzenmueller, assistant secretary and assistant treasurer, has been elected secretary of the company and will continue as assistant treasurer.

Moorhouse joined McKee in 1929, in 1947 was elected secretary and a member of the board of directors, and in 1953 became secretary-treasurer.

Ganzenmueller has been with McKee 25 years. He was appointed assistant treasurer in 1947 and assistant secretary as well as assistant treasurer in 1953.

Ford Motor Co. Enters Heavy Truck Field . .

by addition of a line competitive with the biggest gasoline-powered trucks made. Ford also has inaugurated a new marketing system for the heavy trucks.

According to J. O. Wright, Ford vice president, since the war trucks have virtually doubled the percentage of long distance hauling which they handle. The new line includes a wide selection of heavy-duty tilt cab, conventional and tandem models ranging from 25,000 to 51,000 lb. GVW and 50,000 to 75,000 lb. GCW.

Basis of the new marketing system for the heavy trucks is 350 specialized Ford dealers throughout the country who have elected to be primary marketing points for the sale and service of the new line. All Ford dealers will sell the complete line of trucks. However, under the new sys-

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tem, those who have not elected to adopt the plan will purchase the heavy duty models through a specialized dealer for sale to their customers.

Mich. Steel Tube Merges With Standard Tube . .

upon approval by a vote of shareholders of both companies, according to Stanley L. Willis, president of Standard Tube Co., and Harry J. Longeway, president of Michigan Steel Tube Products Co.

Standard Tube will become the surviving company under terms of the agreement of merger and will function under that name.

Weatherford Officials Attend 1-Week Seminar . .

at the Institute of General Semantics in Lakeville, Conn. Included were Bernie Lawson, area headquarters manager, Houston; Lee Martin, western division manager, Abilene; Jimmie Smith, eastern division manager, Lafayette; Bill Louderback, advertising and public relations manager, Houston; Homer Longino, southern division manager, Corpus Christi; T. W. Martin, vice president of finance, Houston; Robert O. Isham, assistant finance officer, Houston; and Robert P. Turnbull, sales and service engineer, Houston.

Weatherford Oil Tool Co. uses the seminar to promote creative thinking and to expand leadership qualities.

Shaw Made Production Mgr. By Tex-Tube, Inc. . .

at its Houston plant. I. W. Shaw most recently was with Ford Motor Co. as general superintendent of the tube mills and drive shaft department. Prior to that he was welding superintendent for Standard Tube Co. and Republic Steel Co. He was with Republic for 15 years in the steel and tubes division and has had 25 years' experience in the manufacture of welded pipe and tubing.

South Chester Tube Elects W. C. Hale, Jr. . .

as president. He has also been elected chairman of the board of the tube company's subsidiary, Dodge Steel Co., Tacony, Philadelphia. He will continue to serve as president of Dodge Steel Co. and of South Chester Corp., Lester, Pa., as well as president of Southco's subsidiary. Lion Fastener Co., Inc., Honeoye Falls, N. Y., and as executive vice president of Chester Tidewater Terminal, Chester, Pa.

L. A. Estes, in retiring as board chairman of Dodge Steel Co., South Chester Corp., and Lion Fastener and as president of South Chester Tube, will continue to serve as president of Chester Tidewater Terminal, Chester, Pa.

New Mill Begins Operation For Lone Star Steel . .

as the first of three phases in the company's $8,000,000 expansion program, according to E. B. Germany, president. Other phases of the program include a reinforcing bar mill, completed and soon ready to begin production, and a fifth open-hearth furnace, the first steel for which was erected recently.

The new stretch-reducing mill was designed and built by Mannesmann-Meer Engineering & Construction Co. in Dusseldorf, Germany. The complete mill was erected in Germany

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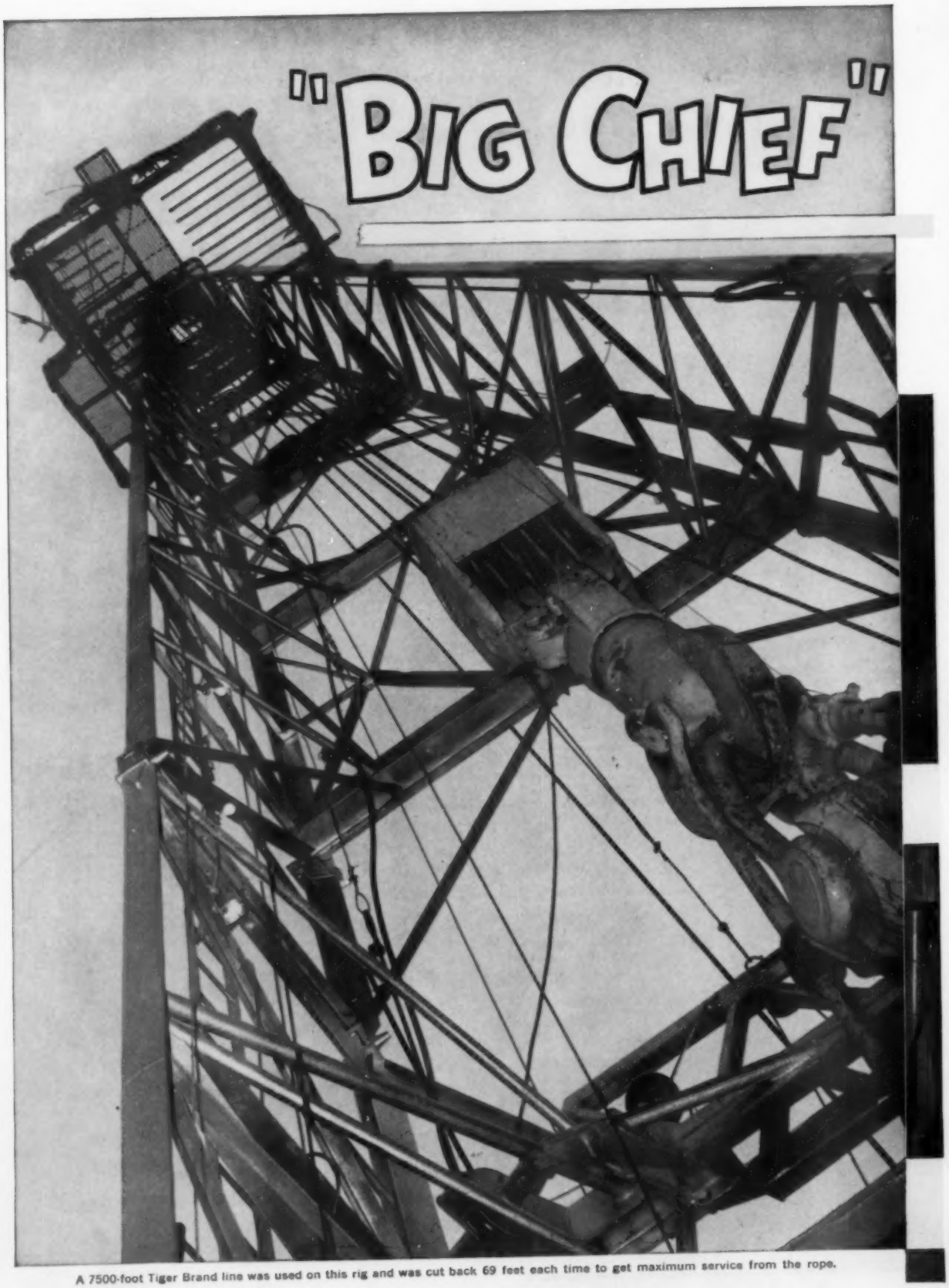

A 7500-foot Tiger Brand line was used on this rig and was cut back 69 feet each time to get maximum service from the rope.

gets heap big run

of 120,000 ton-miles from one 7500-foot Tiger Brand Wire Rope

Joe Blackman, American Wire Rope Specialist, and E. J. Stufflebeam, tool pusher, check a piece of wire rope for wear after the 120,000 ton-mile run.

Drilling was tough in this area and vibration severe, but the Tiger Brand lines withstood it without trouble.

This is the best ton-mile record made in the Eola Field according to Mr. E. J. Stufflebeam, tool pusher on the Big Chief Drilling Company's Rig No. 29 in Garvin County, Oklahoma. He goes on to say, "I've run experiments on various lines, including high strength, but we've got better runs from Tiger Brand than any other ropes we ever used. One reason is that American Steel & Wire sends a field man around who checks what is happening and offers good suggestions on how to improve wire rope life."

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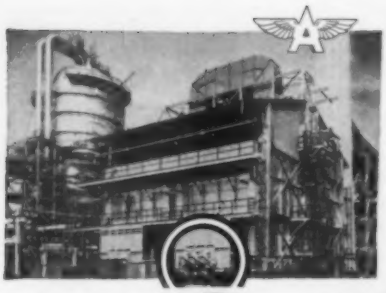
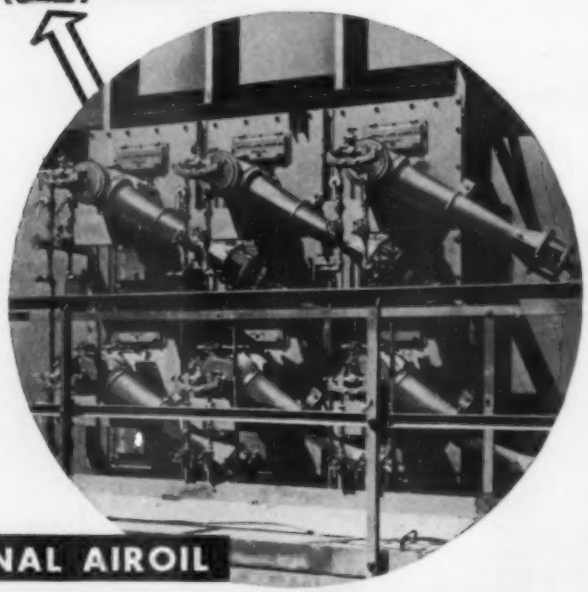


Firing

CRUDE DISTILLATION UNIT HAVING WORLD'S HIGHEST THRUPUT . . .



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and tested before it was dismantled and shipped to Lone Star. The new product will be known as SR (stretch-reduced) casing and tubing, according to Walter T. Moreland, vice president, sales.

Century Electronics Names Sales Representative . .

for the firm's industrial instruments. Engineering Services Co., Kansas City, Mo., has been appointed for the Missouri, Kansas, Nebraska, Iowa and southern Illinois area, according to T. J. Ray, Jr., vice president of sales, Century Electronics & Instruments, Inc., Tulsa.

Engineering Services has branch offices in St. Louis, Mo.; Cedar Rapids, Iowa; and Wichita, Kans. The sales firm is headed by R. B. Dil'on and Leon Pultman.

Tube Turns Plastics, Inc. Promotes D. A. Drake . .

D. A. DRAKE

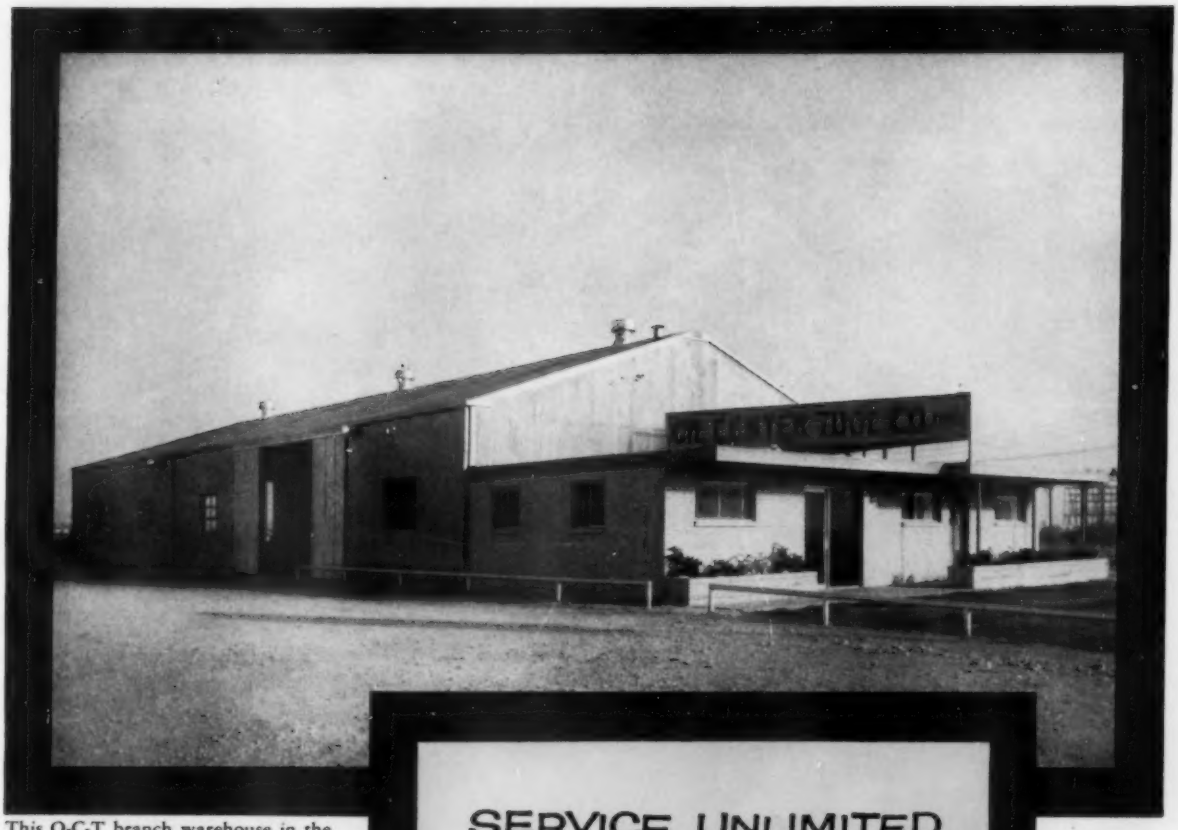
to southwestern district manager, according to Carl B. McLaughlin, executive vice president. The firm has established a full-time district sales office in the Southwest with headquarters at Houston. Tube Turns Plastics recently announced a new line of lightweight, unplasticized, injection-molded fittings that are expected to cut costs of PVC piping in oil and gas fields and other low pressure, moderate temperature applications. Drake will specialize in servicing those industries.

Drake was employed by Whayne Supply Co. before joining Tube Turns Plastics in 1956.

Kaiser Steel Corp. Appoints R. W. Cutler . .

manager of engineering and estimating at the Montebello fabricating division plant, according to Jack J. Carlson, vice president and general manager. For the past 2 years, Cutler has been self-employed as an engineering consultant and has worked in this capacity at Montebello fabricating division since March 1957.

From 1952 to 1956 he was a partner in Vernon Construction Co. Prior to that time he held positions of vice president of production and engineering with Southwest Welding & Manufacturing Co. and assistant chief engineer with Consolidated Western Steel.



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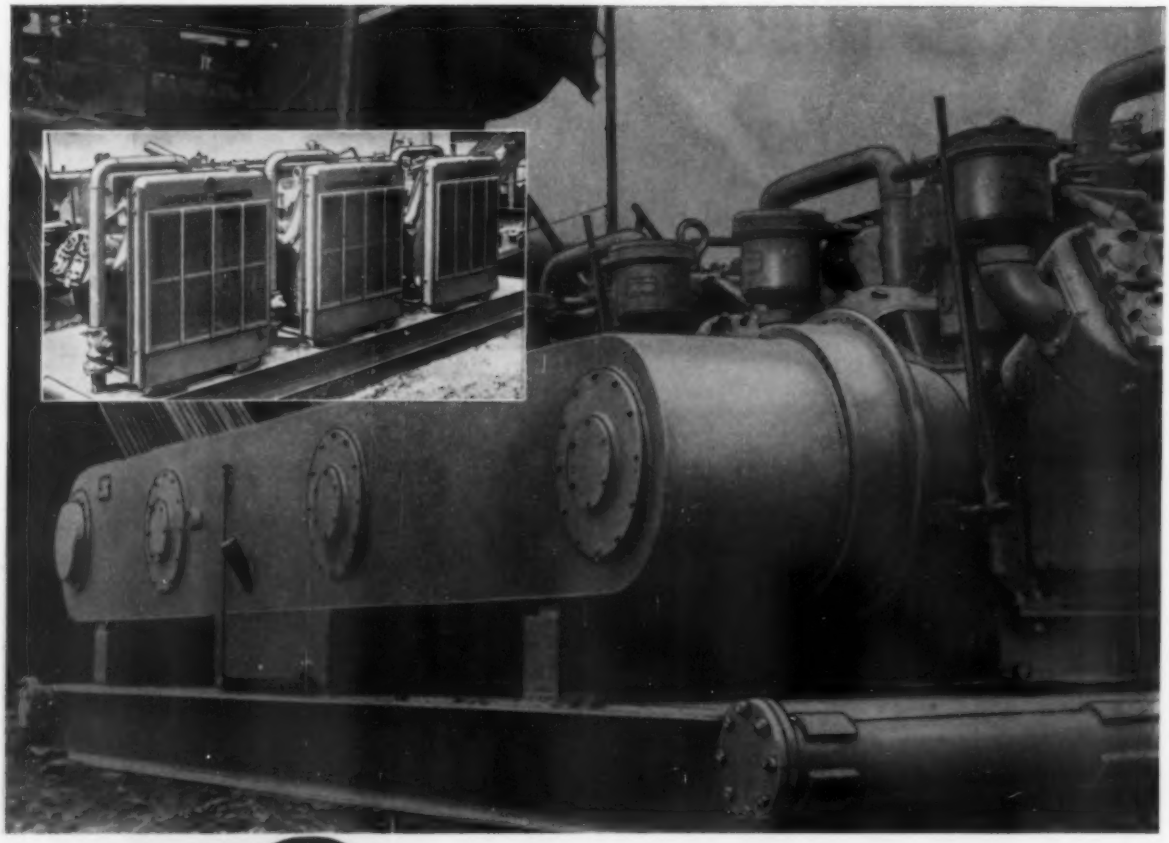

Diamond Roller Chains in their third year of service on this Air Drilling Compressor Compound Unit

The original Diamond Oil Country Roller Chains are still driving this Gardner-Denver Compressor unit now in its third year of "continuous" duty in air drilling.

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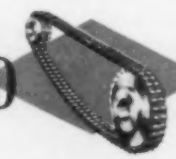
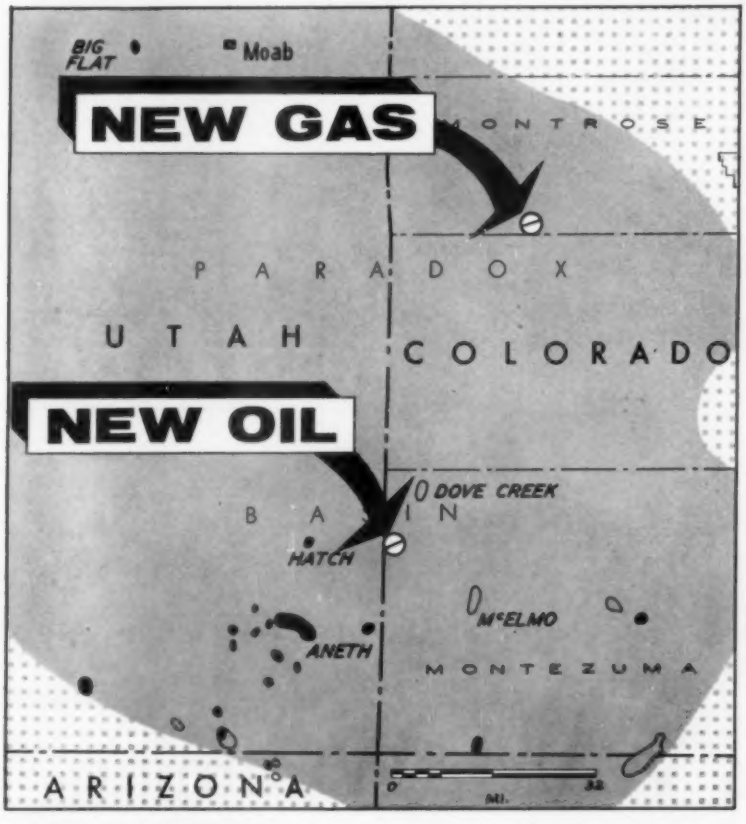
DIAMOND  **ROLLER CHAINS**



SOUTHWESTERN COLORADO is on its way to claim a share of the Paradox basin payoff. Remote wildcats in Montrose, Dolores, and Montezuma counties are dangling prospects of two new gas fields and one new oil field before the eyes of Colorado operators.

Paradox Spills Over Into Colorado

By Frank J. Gardner
Exploration Editor

FOR 2 YEARS NOW, Colorado has stood quietly by, watching the surge of oil and gas discovery that has enveloped its western neighbor, Utah. Confidently, operators in Colorado have felt that sooner or later, the play must come eastward into their state.

Three strikes on tap . . . Now it's happened. At least three prospective discoveries are keeping Paradox basin scouts on their toes today. Two of these prospects have pointed to new gas fields; the third is promising oil. Successful completion at any one of them would mark the first significant extension of the Paradox play into western Colorado.

In southern Montrose County, gas has been unofficially reported flowing at 5 M.M.c.f. per day from J. G. Dyer's 1 Government, Section 4-45n-16w. Production is from Upper Pennsylvanian perforations at 4,602-24, 4,646-4,754, and 5,139-96 ft. Top of the Hermosa formation was reported from samples at 4,890 ft.; the operator took the well down to a total depth of 7,142 ft. and plugged back to 5,440 ft. after finding nothing commercial in the Paradox-Pennsylvanian section. This well is on a mapped surface uplift known as "Montrose anticline" or as a southeastern extension of the "Paradox Valley uplift". Tests were continuing at last report.

At about the same time as the Dyer strike, a more significant one was reported from Montezuma County . . . this one an oil prospect. In Section 11-37n-20w, Hathaway Co. and Big Horn-Powder River Corp. tested their 1 Government wildcat. Drill-stem test at 5,457-67 ft. in lower Paradox recovered 1,540 ft. of clean oil. Operators are busily taking cores below 5,478 ft. at this writing.

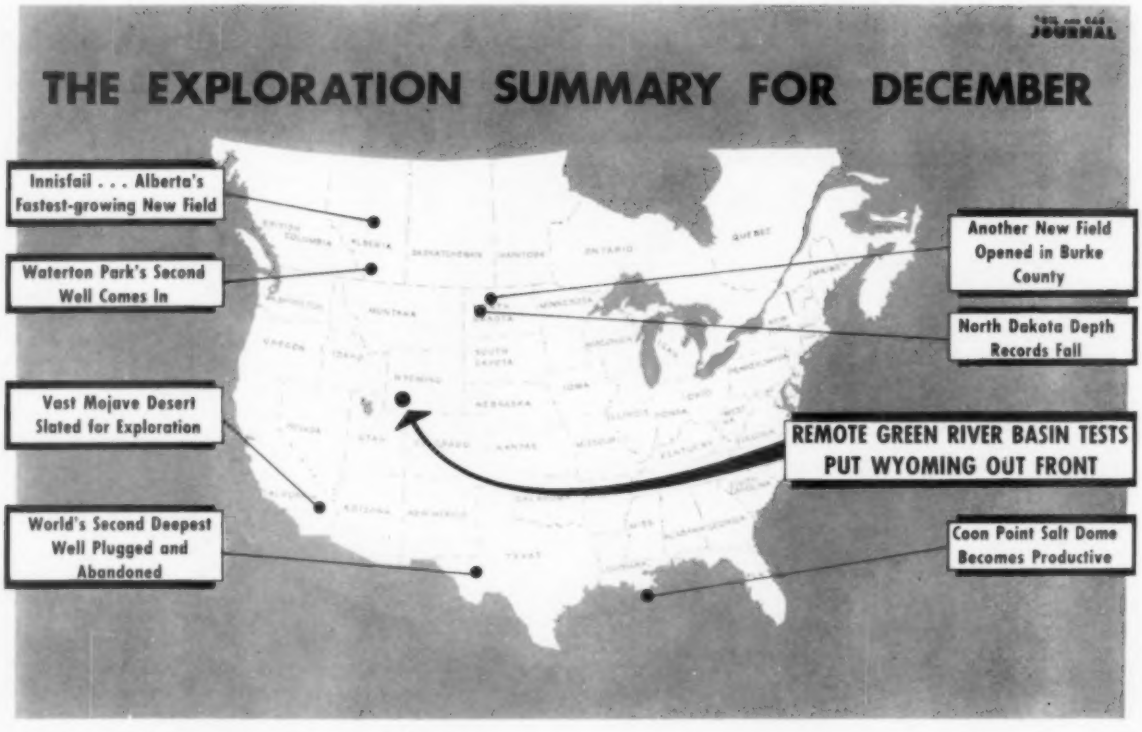
This is the first indication of a commercial oil discovery in the Colorado portion of the Paradox basin, and if it makes a good well, the Utah fever will swiftly spread eastward. The prospect lies 1½ miles northeast of another wildcat, the 1-A Government, drilled by the same operators, but now shut down.

The earlier well, the 1-A, had slight shows of oil and gas in the Paradox section on tests at 5,861-5,927 5,855-67, 6,064-6,119 and 6,095-6,170 ft.

In yet a third western Colorado county, Dolores, Carter Oil Co. 1 Glade Unit, located on the Glade anticline in Section 11-41n-17w, has given up gas at commercial rates. On a drill-stem test of the Hermosa at 5,785-5,905, this one flowed at a rate of 8,170 M.c.f. per day. With total depth of 6,255 ft., the wildcat is waiting on completion rig.

Show what lies ahead . . . Success at these three remote wildcats is some small indication of what lies in store for the rig-happy Four Corners region. Venturesome operators are slowly stepping out from the concentrated play in the Aneth-White Mesa area into less highly regarded territory. Oil discoveries at Hatch Unit, 12½ miles due west of the Montezuma County wildcat, and at Big Flat, far to the north, west of Moab, have thrown open practically all the vast Paradox basin to 1958 exploration.

In a two-state search . . . The Hatch well, a Paradox strike, stretched the Aneth play 10 miles north; the Montezuma well could stretch it 10 miles east. The Big Flat discovery from the Mississippian has triggered an entirely new search for pre-Pennsylvanian reservoirs throughout the northern half of the basin. Now, with new encouragement in Dolores and Montrose counties, you can look for some spirited drilling campaigns encompassing all of southeastern Utah and western Colorado.


THE EXPLORATION SUMMARY FOR DECEMBER
Innisfail . . . Alberta's Fastest-growing New Field
Waterton Park's Second Well Comes In
Vast Mojave Desert Slated for Exploration
World's Second Deepest Well Plugged and Abandoned
Another New Field Opened in Burke County
North Dakota Depth Records Fall
REMOTE GREEN RIVER BASIN TESTS PUT WYOMING OUT FRONT
Coon Point Salt Dome Becomes Productive

Green River basin is lively as . . .

Wildcatters Watch Wyoming

By John C. McCaslin
District Editor

THE EXPLORATORY YEAR ended with Wyoming the center of wildcat attraction. Focal point of this new interest is the Green River basin in the southwestern part of the state. Other wildcat happenings of the month included offshore news, completion of the world's second-deepest hole, new exploration plans for a remote California desert region, depth records in North Dakota, additional gas success in Alberta's southern Foothills belt, and fast development of a new reef field 60 miles north of Calgary.

Watch Wyoming . . . This Rocky Mountain state has been one of the busiest drilling areas in the country for the past several months. Rank wildcatting has been scattered throughout the state's 10 major basins. During December, two of the most important wildcats in the state promised success. These rank tests lie in the Green River basin, one of Wyoming's biggest and least-explored regions.

The two wildcats that grabbed December headlines in the Rockies are on large units in Sweetwater County . . . El Paso Natural Gas Co. 1 Desert Springs Unit and Ohio Oil Co. 1 Wamsutter Unit.

Both wildcats are in virgin wildcat country near the south rim of the Red Desert basin, a part of the Green River basin. The Desert Springs wildcat flowed gas from the Lewis-Cretaceous and from the Mesaverde Cretaceous, while Ohio's Wamsutter well recovered gas on drill-stem tests of the Mesaverde.

The Desert Springs prospect is 11 miles north of Tablerock field; the Wamsutter well is 20 miles southeast. Successful completion of these two wildcats would point to a great future for the Green River and its junior basins, the Red Desert and Washakie.

Oil field in a hurry . . . Innisfail Devonian D3 reef field, 60 miles north of Calgary, has mushroomed since last June into Alberta's fast-developed discovery of 1957.

In mid-December, there were 12 producing wells, 9 drilling, and 23 more slated for 1958 drilling. Well potentials are around the 500-bbl. per day mark with field reserves estimated at more than 15 million barrels.

Foothills belt grows . . . The Foothills belt running along the Rocky Mountain front of southwestern Alberta which boasts such fields as Pincher Creek, Savanna Creek, Turner Valley, and Jumping Pound, now has another prolific producing area—Waterton Park. Shell Oil Co. brought in the second Mississippian gas well at Waterton Park giving impetus to the belief that the new trend may tie in with Castle River field for a gas area of at least 14 miles in length.

North Dakota records . . . Amerada Petroleum Corp. smashed this state's producing depth record in December and gave Beaver Lodge field four below-11,000-ft. producers.

The new deep producer for the state is the 1 Hernfindahl-Kvam, producing in the Silurian at 11,714-44 ft. The

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Total December Completions, Exploration and Development

	Total completions							Wildcat wells							Act.
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	op.
Alabama	6	3	0	0	3	0	63,831	3	0	0	0	3	29,315	0	15
Arkansas	92	47	0	1	44	0	281,186	25	1	0	0	24	93,766	0	91
California	188	119	0	6	61	2	780,775	43	1	0	0	42	211,018	0	211
Colorado	70	14	0	9	47	0	364,086	41	3	0	1	37	215,532	0	121
Florida	1	0	0	0	1	0	4,650	1	0	0	0	1	4,650	0	1
Illinois	203	81	0	4	118	0	448,573	41	3	0	0	38	85,076	20	418
Indiana	118	36	0	4	70	0	213,010	36	0	0	0	36	65,315	42	94
Kansas	351	160	1	33	152	5	1,273,863	79	12	0	6	61	302,610	10	432
Kentucky	92	25	0	15	52	0	136,485	20	2	0	0	18	29,287	78	161
Louisiana	295	119	22	20	134	0	2,360,442	52	3	1	5	43	468,371	0	493
North	111	47	0	8	56	0	424,237	25	2	0	0	23	132,320	0	179
South	136	47	22	3	64	0	1,454,863	17	0	1	0	16	207,538	0	247
Offshore	48	25	0	9	14	0	481,342	10	1	0	5	4	128,513	0	67
Michigan	43	21	0	2	20	0	126,673	11	1	0	1	9	27,304	21	110
Mississippi	25	7	1	0	17	0	206,225	10	0	0	0	10	76,889	0	56
Montana	36	10	0	0	26	0	155,574	26	1	0	0	25	102,015	7	65
Nebraska	67	26	0	0	41	0	398,261	29	5	0	0	24	163,792	0	71
New Mexico	159	69	1	49	40	0	770,166	21	2	0	0	19	96,089	10	285
Northwest	82	22	0	47	13	0	368,490	7	1	0	0	6	20,721	0	165
Southeast	77	47	1	2	27	0	401,676	14	1	0	0	13	75,368	10	120
New York	35	17	0	0	0	18	35,000	0	0	0	0	0	0	35	11
North Dakota	43	20	0	0	23	0	285,464	27	6	0	0	21	166,289	0	75
Ohio	71	44	0	8	19	0	164,650	2	0	0	1	1	7,231	62	135
Oklahoma	470	231	8	23	184	24	1,612,241	58	3	2	2	51	238,979	85	931
Pennsylvania	287	144	0	91	52	0	854,717	18	0	0	3	15	196,799	59	84
South Dakota	4	0	0	0	4	0	10,283	4	0	0	0	4	10,283	0	2
Tennessee	3	0	0	2	1	0	1,500	3	0	0	2	1	1,500	3	0
Texas	1,569	792	73	63	623	18	6,834,708	356	29	7	9	311	1,601,958	52	1,251
Dist. 1	105	36	3	7	58	1	299,355	34	0	0	2	32	89,235	0	42
Dist. 2	49	14	3	10	22	0	274,460	13	1	1	0	11	79,370	0	45
Dist. 3	129	56	19	9	44	1	842,620	25	2	6	1	16	223,118	0	109
Dist. 4	142	27	14	7	93	1	675,651	41	1	0	1	39	210,410	0	72
East	113	44	15	1	53	0	555,550	36	2	0	0	34	164,848	0	56
Dist. 7-B	205	94	0	2	109	0	613,324	66	10	0	1	55	216,618	26	131
West	460	334	11	4	107	4	2,275,548	77	8	0	2	67	377,704	20	582
Dist. 9	252	113	0	9	119	11	808,374	54	5	0	0	49	178,154	6	101
Dist. 10	114	74	8	14	18	0	489,826	10	0	0	2	8	62,501	0	113
Utah	36	28	0	0	8	0	207,086	7	1	0	0	6	39,610	0	121
Washington	1	1	0	0	0	0	4,135	1	1	0	0	0	4,135	0	2
West Virginia	57	2	0	34	21	0	164,718	4	0	0	2	2	22,086	50	259
Wyoming	65	30	0	2	33	0	277,142	32	3	0	0	29	145,603	6	187
Dec. 1957	4,387	2,046	106	365	1,803	67	18,035,444	950	77	10	32	831	4,405,502	540	5,682
Nov. 1957	4,092	2,017	88	279	1,625	83	16,757,937	837	92	11	25	709	3,968,885	591	5,717
Total 1957	53,838	27,476	688	3,912	20,701	1,061	221,900,539	11,739	1,172	105	375	10,087	55,794,214	7,111	
Total 1956	58,160	30,730	428	4,115	21,838	1,049	233,902,000	13,034	1,613		469	10,952	62,027,000	9,484	

Note: C.T.—Cable tool compl. Act. op.—Active operations. D.D.—24; Calif. 3, Kans. 1, S. La. 3, N. M. 1, Okla. 6, Tex. 8, Wyo. 2.

Western Canada

	Total wells					Cum.	Wildcat wells					Cum.
	Total	Oil	Gas	Dry	Footage	1957	Total	Oil	Gas	Dry	Footage	1957
Alberta	112	62	11	39	560,006	1,434	35	2	1	32	171,132	414
Saskatchewan	83	59	0	24	369,507	1,199	23	2	0	21	81,476	295
Manitoba	16	11	0	5	33,954	222	6	1	0	5	12,543	68
British Columbia	12	1	5	6	58,028	92	6	1	2	3	37,490	58
Northwest Territories						3						3
Western Canada	223	133	16	74	1,021,495	2,950	70	6	3	61	302,641	838

well is also a Devonian well at 10,266-10,474 ft. Other pre-Madison completions in Beaver Lodge were: A-1 Iverson-Nelson Unit, 1 Iverson-Nelson Unit, and 1 Boe Olson Unit.

Regular pay at Beaver Lodge and all Nesson anticline fie'ds is the Madison-Mississippian. Amerada was busy all during 1957 digging into the Silurian and Devonian rocks of the anticline. The company set a drilling-depth record at 14,828 ft. at the 9-A Unit. Silurian and Devonian discoveries in this area are part of a new exploratory thinking in the Williston basin. The interest in pre-Madison exploration began in earnest early in 1957 with the discovery of Silurian oil at Outlook in northeastern Montana. Beaver Lodge is slated for more deep drilling in 1958.

More Burke County success . . . The seventh wildcat to find oil in 1957 in this northern North Dakota border county is Petroleum Corp. of America and Tom Jordan, Jr. 1 Ballantine, 7 miles north of Lignite, the focal point of Midale-Mississippian success in the area. The Ballantine discovery flowed 104 bbl. of oil on a 9½-hour test of the Mississippian. The tremendous success of Burke County exploration in 1957 is expected to continue with zest during 1958.

Record hole No. 2 . . . The world's second-deepest hole was plugged and abandoned at 21,687 ft. in West Texas. It is Pan American Petroleum Corp.'s 1-CS University, 13 miles southeast of Fort Stockton in Pecos County. Another well, this one by Phillips, is drilling below 20,000 ft., 7 miles away.

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. . . through neutron/neutron log calibration—with accuracy never before obtained.

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Developed ABSOLUTE CALIBRATION FOR RADIATION LOGGING
. . . producing a Simultaneous Radiation Log of unequalled repeatability regardless of radiation source strength.

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Breakdown of Field Wells Drilled in December 1957, by Depth

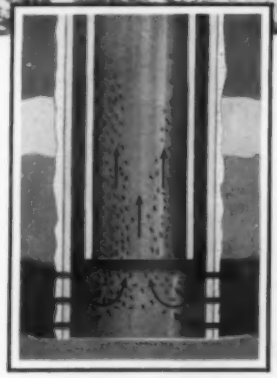
	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama							3																				
Arkansas	11	27	16	2							1									4	10	4	2				
California	21	28	23	15	10	12	5	4				1		5					4	5	2	7	1	2			
Colorado				9	1	1				1		1		6					1			5	3	1			
Illinois	6	32	37	3						4									13	38	28	1					
Indiana	2	27	7							2	1								18	20	5						
Kansas	1	21	79	45	3							8	13	6					1	5	49	36	5				
Kentucky	13	9	1							1	2	10	2						12	19	2	1					
Louisiana	5	19	12	3	14	34	30	15	5		2	4		1	2	2	3	1	3	9	16	10	4	17	22	6	4
North	5	19	12	2	6	1					2	4		1	1				2	6	11	8	2	4			
South				1	5	18	24	15	5							1	1	1	1	2	5	2	1	10	17	6	4
Offshore					3	15	6								1	1	2						1	3	5		
Michigan	1	3	9	6	1						1									3	3	5					
Mississippi					2	1	3	2												1			5	1			
Montana		3		1	2	3																1					
Nebraska					21																		17				
New Mexico		8	15	17	17	3	7	1			5	15	12	17					1	4	5	3	3	1	4		
Northwest			1	3	16	1					5	14	11	17						4	1		2				
Southeast		8	14	14	1	2	7	1				1	1						1		4	3	1	1	4		
New York	17																		18								
North Dakota			4			6	4														1		1				
Ohio	12	3	29							2	2	1	2						8	2	6	2					
Oklahoma	27	66	48	38	32	16	6	1			3	1	10	7					32	43	41	23	15	3			
Pennsylvania			88							4	4	8		7						37							
Texas	53	133	221	144	176	70	25	6	1	1	6	14	10	17	4	2			41	90	54	57	58	22	6	2	
Dist. 1	13	10	11	1	1	3				1		1		1		2			5	8	9	2	2			1	
Dist. 2				2	9	4					2	3	2	2	1							7	3	1			
Dist. 3	4	1	5	13	17	19	7		1			3	3	2					2	4	3	4	9	6	1		
Dist. 4	1	10	4	6	10	9							4	2					7	11	7	6	18	6			
East	5	6	6	9	23	8								1					1	5	1	1	8	2		1	
Dist. 7-B	5	35	14	15	15							1							10	28	7	6	3				
West	5	30	101	84	75	20	16	6				1	1						3	5	12	13	4	3	4		
Dist. 9	20	39	13	14	22									9					13	29	11	17	11				
Dist. 10		2	67		4	7	2				4	5				3					4	1		4	1		
Utah					27																		2				
West Virginia		2								1	17	9	4	1					2	9	3	5					
Wyoming	7	4	1	1	14							1	1						2	1			1				
Total U. S.	166	529	502	284	320	146	83	29	6	12	40	153	54	60	6	4	3	1	156	290	225	160	117	47	32	8	4
Western Canada		14	10	70	26	7					3	7	1		1	1				1	1	10	1				
Alberta		4	5	18	26	7					3	4	1		1	1				1		5	1				
Saskatchewan			5	52																		3					
Manitoba		10																									
British Columbia												3									1	2					

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft. F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.

Breakdown of Wildcats Drilled in December 1957, by Depth

	Oil									Gas									Dry								
	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I	A	B	C	D	E	F	G	H	I
Alabama																							1	1			1
Arkansas			1																	4	12	4	3	1			
California			1																6	7	4	6	7	7	4		1
Colorado					3								1						3			8	24	2			
Florida																						1					
Illinois		2	1																7	18	13						
Indiana																			9	21	6						
Kansas		1	6	4	1								3	3					1	6	23	28	3				
Kentucky		1	1																10	5	3						
Louisiana					1		1	2									2	2	1	1	7	2	10	5	7	7	3
North					1		1												1	1	7	2	10	1		1	
South								1																2	6	6	2
Offshore								1									2	2	1					2	1		1
Michigan			1										1						1	5	3						
Mississippi																					2		3	2	3		
Montana			1																1	9	5	3	5		2		
Nebraska					5																4	3	17				
New Mexico	1							1											2	3	5	4	3	1		1	
Northwest	1																		1	1	1	2	1				
Southeast								1											1	2	4	2	2	1		1	
North Dakota					4			2													5	6	8	2			
Ohio												1										1					
Oklahoma				1	1	3							1	1					12	8	6	9	9	5	2		
Pennsylvania													1	1	1								13	2			
South Dakota																			1		3						
Tennessee										2									1								
Texas		5	5	10	4	6	4	1	1			6		2	1				23	83	54	42	70	23	9	6	1
Dist. 1												2							10	11	4	3	3			1	
Dist. 2				1		1															1	2	6	2			
Dist. 3						2	4	1	1						1					1			5	7	2	1	
Dist. 4				1								1							5	7	2	3	13	5	3	1	
East					1	1													2	6	6	4	14	2			
Dist. 7-B		3	1	5	1							1							1	23	18	5	8				
West		1	2	2	1	2								2					3	16	12	13	13	3	4	2	1
Dist. 9		1	2	1	1														2	19	11	10	6			1	
Dist. 10												2										2	2	4			
Utah					1															1		1	3	1			
Washington				1																							
West Virginia													1	1							1		1				
Wyoming				1	1	1													6	2	2	4	8	5	2		
Total U. S.	1	9	17	17	21	10	5	6	1	2		7	8	8	2	2	2	1	84	173	158	122	188	57	29	14	6
Western Canada		1		3	1	1						1	1				1			12	19	15	9	6			
Alberta					1	1						1								2	10	8	7	5			
Saskatchewan				2																6	7	6	2				
Manitoba		1																		4	1						
British Columbia				1									1				1				1	1		1			

NOTE: A = 0-1,250 ft.; B = 1,250-2,500 ft.; C = 2,500-3,750 ft.; D = 3,750-5,000 ft.; E = 5,000-7,500 ft. F = 7,500-10,000 ft.; G = 10,000-12,500 ft.; H = 12,500-15,000 ft.; I = 15,000 ft.



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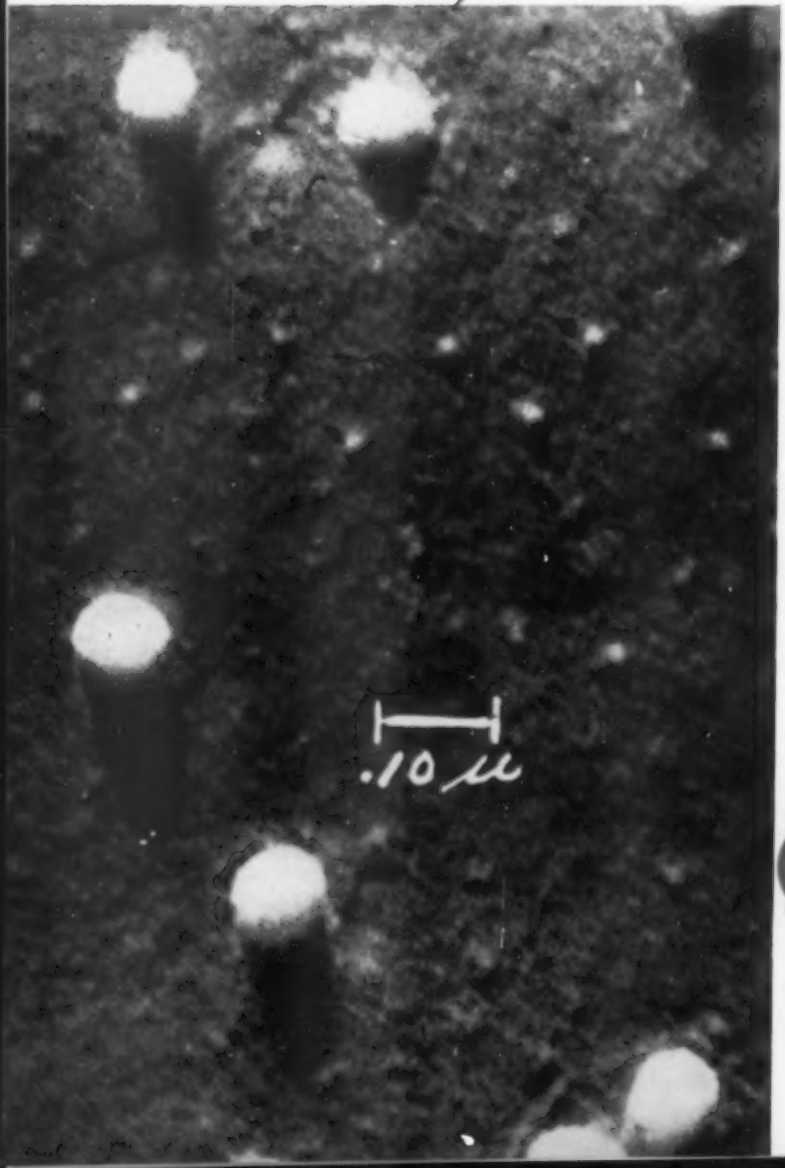

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Footage Breakdown for December

	Field			Wildcat		
	Oil	Gas	Dry	Oil	Gas	Dry
Alabama	34,516	.....	.....	.....	.....	29,315
Arkansas	118,109	2,330	66,981	3,617	.....	90,149
California	463,386	35,726	70,645	2,775	.....	208,243
Colorado	56,355	39,347	52,852	17,927	4,882	192,723
Florida	.....	.....	.....	.....	.....	4,650
Illinois	191,426	1,516	170,555	6,988	.....	78,088
Indiana	74,991	3,368	69,336	.....	.....	65,315
Kansas	511,580	115,280	344,393	43,212	29,356	230,042
Kentucky	27,735	45,227	34,236	4,575	.....	24,712
Louisiana	1,083,294	123,353	685,424	45,998	67,912	354,461
North	132,230	32,592	127,095	17,323	.....	114,997
South	736,715	40,885	469,725	14,027	.....	193,511
Offshore	214,349	49,876	88,604	14,648	67,912	45,953
Michigan	63,526	1,352	34,491	3,066	4,080	20,158
Mississippi	84,729	.....	44,607	.....	.....	76,889
Montana	49,081	.....	4,478	3,280	.....	98,735
Nebraska	131,930	.....	102,539	32,716	.....	131,076
New Mexico	349,503	217,997	106,577	13,721	.....	82,368
Northwest	114,747	210,400	22,622	515	.....	20,206
Southeast	234,756	7,597	83,955	13,206	.....	62,162
New York	17,000	.....	18,000	.....	.....	.....
North Dakota	109,823	.....	9,352	52,914	.....	113,375
Ohio	105,590	15,463	36,366	.....	3,437	3,794
Oklahoma	837,367	107,294	428,601	32,735	10,961	195,283
Pennsylvania	224,860	227,929	205,129	.....	19,919	176,880
South Dakota	.....	.....	.....	.....	.....	10,283
Tennessee	.....	.....	.....	.....	1,000	500
Texas	3,739,988	257,613	1,235,149	214,926	39,941	1,347,091
Dist. 1	98,440	31,846	79,834	.....	5,597	83,638
Dist. 2	100,928	41,412	52,750	13,825	.....	65,545
Dist. 3	434,322	35,187	149,993	84,999	9,687	128,432
Dist. 4	200,933	30,179	234,129	4,960	2,665	202,785
East	291,727	5,671	93,304	13,106	.....	151,742
Dist. 7-B	267,857	3,475	125,374	37,623	3,198	175,797
West	1,690,099	7,377	200,368	42,017	11,728	323,959
Dist. 9	334,490	53,942	241,788	18,396	.....	159,758
Dist. 10	321,192	48,524	57,609	.....	7,066	55,435
Utah	155,350	.....	12,126	5,633	.....	33,977
Washington	.....	.....	.....	4,135	.....	.....
West Virginia	4,153	87,670	50,809	.....	11,238	10,848
Wyoming	113,976	7,745	9,818	17,164	.....	128,439
Total U. S.	8,548,268	1,289,210	3,792,464	505,382	192,726	3,707,394
Western Canada	592,339	50,909	75,606	31,228	19,555	251,858
Alberta	316,264	42,194	30,416	14,400	2,660	154,072
Saskatchewan	254,664	.....	33,367	9,802	.....	71,674
Manitoba	21,411	.....	.....	2,176	.....	10,367
British Columbia	.....	8,715	11,823	4,850	16,895	15,745

EXPLORATION HIGHLIGHTS

This Week in Canada

–Willow Creek
–Virginia Hills
–Boundary Lake

RECOVERY of Dalhousie oil at Willow Creek in southern Alberta, additional success in the Virginia Hills Devonian play in the northwest, and a dual-zone gas discovery in northeastern British Columbia highlighted western Canada's exploration last week.

Willow Creek . . . The team of British American Oil Co., Ltd., and Bailey Selburn Oil & Gas Co., Ltd., found oil shows in the Dalhousie sector of Lower Cretaceous age at the Willow Creek wildcat, 60 miles south of Calgary.

A drill-stem test in this formation, believed to be the best yet found in this formation, recovered 1,500 ft. of oil. The 5 Willow Creek well, located on LSD 5, 12-14-30w4, is slated for completion in the Mississippian at about 12,000 ft.

The Willow Creek wildcat is 23 miles east of Savanna Creek gas field. The drill-stem test in the Dalhousie was taken of a 72-ft. zone at about 10,600 ft.

Virginia Hills region . . . Home Oil Co., Ltd., has indicated success at its follow-up test to the Edith Lake Slave Point Devonian oil discovery, 1 mile southeast of the 11-19 Edith Lake strike in northwestern Alberta.

Oil flowed to the surface during the 38-minute test of a 42-ft. interval at about 8,000 ft. The well is the Home-Regent Swan Hills "A," LSD 4, 20-67-10w5. Coring is being continued at the well and more testing is due.

Edith Lake is one of the Devonian Slave Point discovery areas in the highly promising Virginia Hills region of northwestern Alberta. This new Devonian trend was opened in 1957. Discoveries in the area include Edith Lake, Virginia Hills, Swan Hills, Kaybob, and Iosegun, all of which are considered to be the most important exploratory events in western Canada last year.

British Columbia . . . The Northern Foothills Agreement Group, operated by Texaco Exploration Co., and including British American, Shell, and Mobil, have a dual-zone gas discovery in the northeastern part of the province, 41 miles northeast of Fort St. John.

Both the Bluesky and Gething formations proved productive during drill-stem tests. The best flow rate was found in the Bluesky—4,000 M.c.f. per day.

The well, 7 Boundary Lake, lies in Unit 33 Zone J, N.T.S. Map 94-A-9, 6½ miles northeast of the 6 Triassic oil discovery at Boundary Lake and 19 miles north of oil production in Boundary Lake field. The well made 1,350 M.c.f. per day from the Gething zone. Drilling has resumed at the discovery toward the Triassic for further tests.

EXPLORATION THIS WEEK

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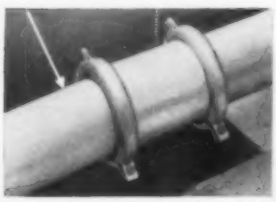

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In Oklahoma

Major County Strike Livens Northwest Play

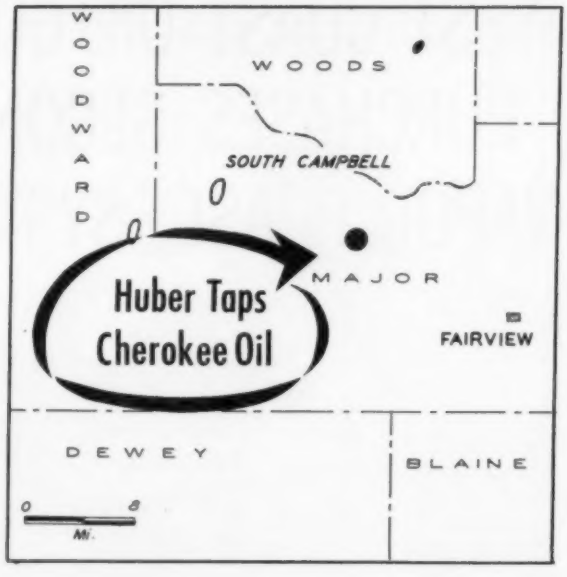
J. M. HUBER CORP. has a Cherokee-Pennsylvanian oil discovery at its 1 Phillips in C SW SW 33-22n-14w, 13 miles northwest of Fairview in Major County.

The well flowed about 70 bbl. of oil per hour on short test of perforations at 6,879-6,912 ft. On the first hour, new-oil flow was 60 bbl.; on second hour it was 78 bbl. on ½-in. choke. Huber has shut in the well for storage space.

The nearest production to this new Pennsylvanian strike is 8½ miles northwest at Pan American Petroleum Corp.'s gas field, a Cottage Grove-Pennsylvanian producer.

Huber's new discovery is another in the fast-growing list of new fields being opened in northwestern Oklahoma. This new oil and gas province became important early last year in Woodward County. During 1957, production was extended throughout Woodward County, revived in Ellis County, opened in Dewey and Blaine counties, and then spilled over into Major County.

The exploratory prospects for 1958 in northwestern Oklahoma are highly promising. The so-called Woodward trend is expected to grow both southeast and northwest. In Harper County, the already important Pennsylvanian producing areas are being steadily strengthened and expanded. One continuous producing area from La-



NEW Cherokee-Pennsylvanian production was opened at J. M. Huber Corp. 1 Phillips, Major County wildcat.

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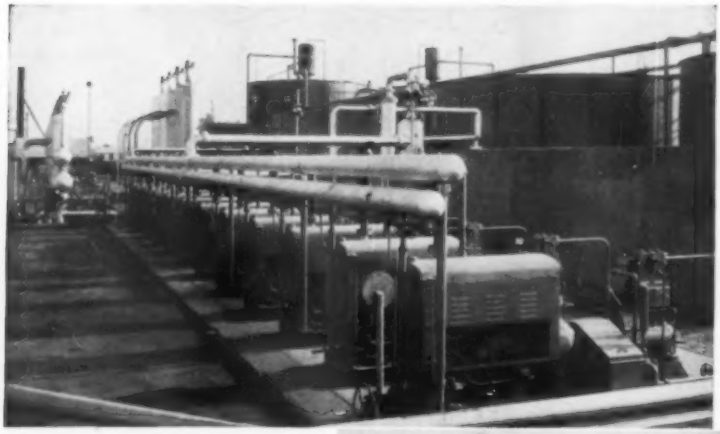

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verne district northwest to Beaver County's Highland area is fast becoming apparent.

CALIFORNIA

Standard Quits Part of Montalvo Development

Standard Oil Co. of California, Western Operations, Inc., has announced suspension of its efforts to develop production to the south in the Montalvo field in Ventura County after two recent dry holes there. The first failure was 2-1026 Patterson Ranch adjacent to the Hollywood Beach area. It was taken to 11,100 ft. It was then plugged back to 5,700 ft., renamed the 2-1028 Patterson and directionally drilled to bottom about 2,000 ft. southeast of the original hole at 11,212 ft. Neither turned up any oil sands. Standard-Western was drilling below 9,270 ft. on 2-1222 Patterson Ranch about 1 mile north of the two dry tests.

Hamilton Bend Extension Looks Good

Humble Oil & Refining Co. reports a good test on a southerly offset to the Hamilton Bend pool discovery well in the Compton Landing Gas field, Colusa County. The well, 2 Hamilton Bend Gas Unit, tested at a 1,220 M.c.f. daily rate on a 2-hour test of the upper zone and 2,350 M.c.f. daily on the lower zone. Perforations are at 2,372-2-475 ft.

North Dome Extended

Standard Oil Co. of California, Western Operations, Inc., scored with a northwest extension try in the North Dome area of Kettleman Hills field, Fresno County. The well, 321-20J Communitization, was completed in the lower McAdams sand extension making 505 bbl. daily of 28.5°-gravity crude through a 34/64-in. choke. Total depth of the well is 11,585 ft.

NORTH DAKOTA

Flaxton Field Adds Two New Wells

Two new producers were added to Flaxton field in Burke County. Petroleum Corp. of America 2-A Sorum, C NW SW 23-163n-91w, flowed 388 bbl. of oil daily from Nesson pay at 5,828-52 ft.

The 3-A Sorum in C NW SE 23-163n-91w, flowed 196 bbl. of oil per day from Nesson pay perforations at 5,810-40 ft.

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DATA—WORLD'S DEEPEST WELL

Job: Richardson & Bass-Mecom-Freeport-Humble-LL&E-SL2414, Well No. 1-L.
Location: Lake Washington Field, Plaquemines Parish, La.
Log. Temp.: 326°F.
Detail: Squeeze Job #4—Cast-iron retainer was set at 21,020 ft. to replug and abandon perforations from 21,419 to 21,465 ft. Dry blend for this job was made up of 30,550 lbs. of UNAFLO cement, 22,800 lbs. of barite, 347 lbs. CMHEC (0.65%); 58 bbls. of water used for 100 bbls. of 17.5 lbs. per gal. slurry. Mixing time was 58 min. At the end of 1 hr. and 59 min. pressure build-up observed, with 88 bbls. squeezed. At pressure of 3,400 psi (casing pressure was 2,000 psi) retainer moved up hole and job bradenhead squeezed to completion. At 2 hrs. and 12 min. (from the start of mixing) 5,800-lbs. obtained, with 95 bbls. squeezed out. Reverse-out of remaining 5 bbls. effected. **Squeeze Job #5, 6, 7**—All similar patterned after #4. CMHEC decreased to 0.56%. In all 3, final squeeze pressure was 6,000 psi. Reverse outs were 10 bbls., 10 bbls., 12 bbls., respectively. No difficulty on any reverse-outs because reversed cement quite fluid on recovery.

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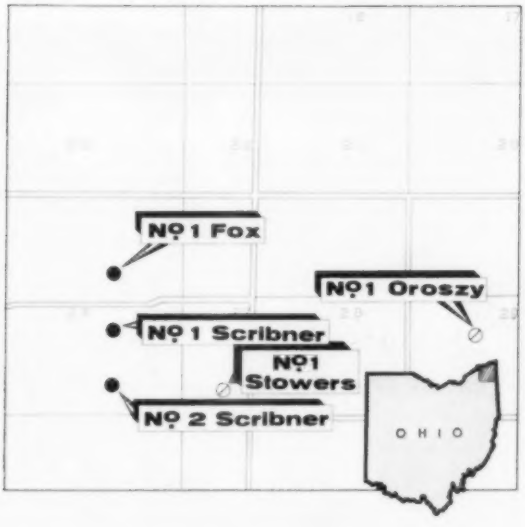

Monroe Township pool grows as . . .

Ohio Leads Drilling in East

THE NEW drilling campaign for Medina sand oil production in the northeast corner of Ohio continues to expand.

Three wells have been completed in the new field near Conneaut in Ashtabula County. The discovery well was the Benedum-Trees 1 Scribner. The second well was the 1 Fox, and the 2 Scribner was recently completed. The operators are using 40-acre spacing. The 1 Fox is north of the discovery well; the 2 Scribner is the south offset to the discovery well.

The 2 Scribner was perforated at 3,285, 3,290, 3,302, and 3,319 ft. with 52 holes. The pay zones in all three wells vary, but a new pay zone of about 10 ft. is expected in the field. The 1 Fox hit the pay 6 ft. higher than the field discovery well; the 2 Scribner found pay 6 ft. lower than the discovery well.

All of these Medina wells have been fractured. The three wells in the new pool are making from 50-60 bbl. of oil per day.

The first three wells in the field were drilled with cable tools. A rotary is being moved in to drill two more wells. The new additions will be 1 Orozy, 1½ miles east of the field discovery, and the 1 Stowers, ½ mile due east of the 2 Scribner.

The Medina oil strike near Conneaut late last year set off one of the biggest exploratory surges in the East in many years. This new pool is about 50 miles from comparable production and is located in a rank wildcatting area of the northwestern shelf of the Appalachian basin. The Monroe Township program extended interest over the line into Pennsylvania where wells are also looking for

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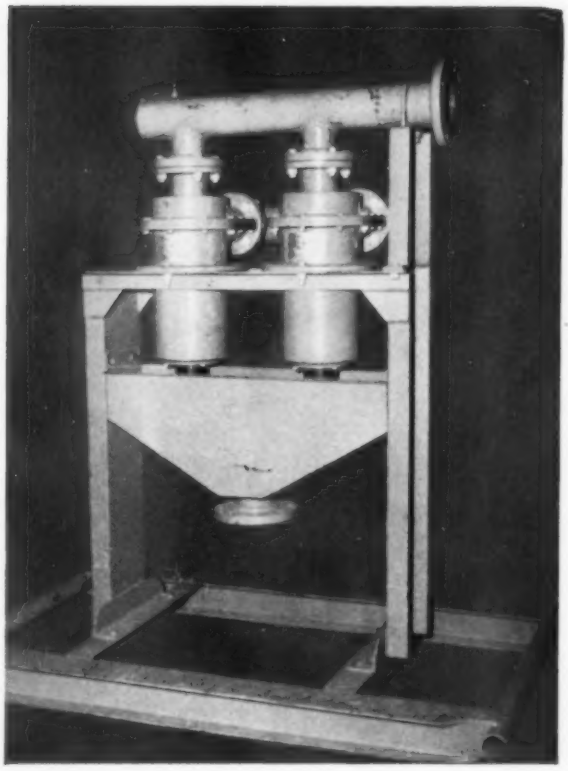

The new Size 2 Dorrco D-Sander is low in both first cost and operating cost. In addition, it is light in weight and easy to move. Designed especially for hard formation drilling with any rig, or slim hole drilling in a wide variety of formations, it brings the benefits of drilling fluids substantially free of drilled solids within the reach of every operator.

The benefits from using Dorrco D-Sanders are many. In many fields along the Gulf Coast, as well as other areas, abrasive sand can seriously reduce the life of bits and pump parts unless a D-Sander is used. In addition, the high viscosity of mud laden with drilled solids reduces drilling rates as much as 25 per cent.

In these areas, important savings in drilling costs result in that section of the hole where unweighted mud can be used.

But recent experience has proved that savings can also be realized in many other areas where abrasive formations are not encountered. In these areas, "flour sand" Dorrco D-Sanders, set to remove all drilled solids above 30 microns in size, result in greatly improved drilling speeds—sometimes in excess of 15 per cent.

In harder formations, drilling rates are slower and drilled solids are produced at a lower rate. In many of these areas, the Size 2 D-Sander, which provides capacities up to 250 gpm, is entirely adequate, yet it costs less to buy, to move and to operate than larger units.

The new Size 2 D-Sander compliments the capacity ranges of the larger sizes 4 and 6. With this new addition, Swaco offers units suitable for any rig and any drilling condition. Write for full information.

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Medina oil in Erie and Crawford counties.

Ohio's Big Play Is Still at Moreland Pool

The big drilling play in Ohio is still the Moreland pool area of Franklin Township, Wayne County.

At the extreme south end of the pool, Vanson Producing Co. completed 2 E. Miller in Section 22 for 250 bbl. of oil per day from the Cinton sand at 3,479-3,517 ft. Also completed was the 4 E. Miller for 900 bbl. per day from the Clinton sand at 3,672-3,714 ft., and the 1 A. Shetler in Section 22 for 250 bbl. per day from the Clinton at 3,494-3,524 ft. All these oil flows were on 24-hour tests after fracturing.

In the middle of the pool, Preston Oil Co. 2 F. O. Gwinn, Section 10, gaged 530 bbl. of oil in 24 hours after fracture from the Clinton at 3,509-80 ft.

At the north end of the pool, Newburg gas production was extended one location north by Ohio Fuel Co. at 1 R. Newstetter, Section 2. The sand was topped at 3,028 ft. and drilled to 3,069 ft. with a gage of 1,230, M.c.f. per day.

First Newburg Oil Well Completed in Marne Pool

First Newburg sand oil production was established in Marne pool by C. J. Seibert et al. The 1 C. Wallace, first quarter, Madison Township, Licking County. The well made 50 bbl. natural, in a 24-hour test of Newburg sand at 2,086-2,104 ft.

TEXAS

SOUTHWEST

Problem Wildcat Opens New Wilson County Field

Lone Star Producing Co. is completing its discovery well west of Stockdale, in Wilson County, following a long siege of hole trouble.

The well, 1-A Hardin, is plugged back from its drilled depth of 5,425 ft. and perforated at 4,882-90 ft. On a 3-hour test through 13/64-in. choke, it flowed at the rate of 134.80 bbl. of 30.7°-gravity oil per day. Flow was with gas-oil ratio of 371 cu. ft. per barrel, and pressure of 900 psi.

It opens a new Cretaceous field on a trend southeast of the extensive shallow Lavernia field.

Drilling first was delayed by stuck drill pipe at 4,883 ft. Hole around this depth continued to give trouble until a string of 7-in. casing was run

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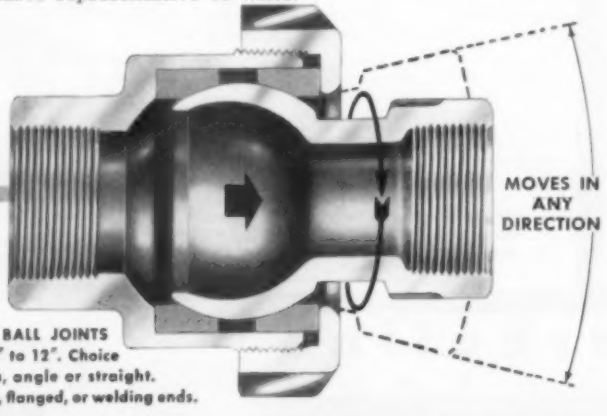

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with bottom at 4,907 ft. Below this, a fractured and creviced section was encountered, in which drilling was plagued with lost-circulation problems, necessitating running 5-in. liner, set at 5,100 ft. Shows were logged below this, but in a series of open-hole tests recovery was mainly salt water.

PANHANDLE

Prolific Well Finaled in Twin-Des Moines Field

Shamrock Oil & Gas Corp. completed the 1 Inez B. Rolett in Twin-Des Moines field, 3 miles northwest of Waka in the west-central part of Ochiltree County, flowing 1,320 bbl. of oil per day, natural. This calculated flow was from perforations at 6,412-54 ft. in the Des Moines-Pennsylvanian. Choke was ¾-in. Location of this big producer is Section 56, Block 4, GH&H Survey.

New Pay Opened in Northeast Lipscomb

The Cleveland sand of lower Missouri-Pennsylvanian age is a new pay for northeastern Lipscomb County.

Pan American Petroleum Corp. completed 2 Gex, 9 miles southeast of Follett and 5½ miles northeast of Lipscomb-Morrow field. The well pumped 50 bbl. of oil per day on potential test from perforations at 7,592-7,636 ft. Location is Section 875, Block 43, H&TC Survey. The closest Cleveland sand production is 50 miles southwest in Daniel field, Ochiltree County.

Canyon Discovery Finaled In Lipscomb County

Humble Oil & Refining Co. 1 Schultz Brothers "E," 11 miles northeast of Lipscomb town and 5 miles northeast of Lipscomb-Morrow field, is a Canyon gas discovery. The well was completed open flow for 2,250 M.c.f. per day on ¾-in. choke from perforations at 7,506-40 ft. This well is 2 miles northwest of the new-pay discovery at Pan American 2 Gex. Location is Section 888, Block 43, H&TC Survey.

Douglas Is New Pay in Kiowa Tonkawa Field

The Douglas-Pennsylvanian sand is a new pay for Kiowa Tonkawa field in northwestern Lipscomb County. The discovery well is Sinclair Oil & Gas Co. 1 E. G. Fulton. The well flowed at the daily rate of 1,113 M.c.f. plus 96 bbl. of salt water from perforations at 5,845-47 ft.

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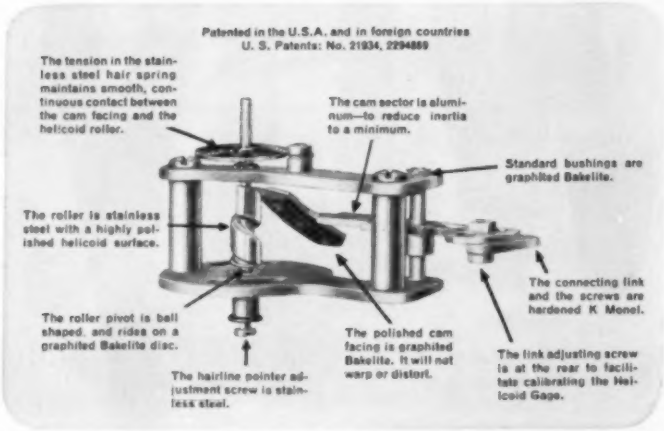
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The cam sector is aluminum—to reduce inertia to a minimum.
Standard bushings are graphited Bakelite.
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The Helicoid Chemical Gage has a guaranteed accuracy of plus or minus 1%. It is applicable for working pressures from 30″ vacuum to 5000 p.s.i. and temperatures to 400° F. It is particularly suitable for chemicals and other viscous fluids which might clog or corrode a Bourdon tube. Pressure and/or vacuum is transmitted directly to the indicating gage element through deflection of a Teflon or Kel F sealing diaphragm.

Tubes built for millions of pressure pulsations

To fit the wide range of applications, Helicoid Bourdon tubes are available in four materials—alloy steel, K Monel, stainless steel and phosphor bronze.

All Helicoid tubes are made from seamless tubing and are carefully designed to give maximum torque and minimum stress. When used within the dial range, they will withstand many millions of pressure pulsations and will not stretch, leak or crack.

For complete information on the Helicoid line of gages write for **Catalog G-52**

Helicoid gives you all these features at prices that are competitive in the quality gage field.

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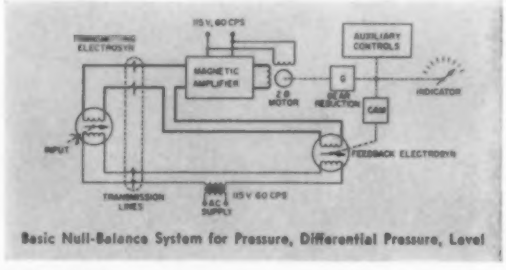

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Basic system consists of signal transmitter, magnetic servo amplifier, null-balance indicator. (No electron tubes, slide wires or continuously moving parts.)

In measuring pressure the Model 501 transmitter utilizes a twisted bourdon tube as the pressure sensing element. This tube converts the pressure into shaft rotation of the ElectroSyn signal generator, a rotary differential transformer. The 8½-volt signal output from the ElectroSyn signal generator is an a-c voltage exactly proportional to the measured variable. Write for ElectroSyn Brochure B257—**Norwood Controls Unit, Detroit Controls Division, 942 Washington St., Norwood, Mass.**

because ElectroSyn offers:

- Higher reliability
- Lower maintenance
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- Can withstand static overload of 300% of rated pressure for a 1% zero shift
- Remote transmission
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AMERICAN-Standard
DETROIT CONTROLS DIVISION

In West Texas

Clear Fork Flows at Bakke

BAKKE FIELD, a relatively small area in central Andrews County, last week gained its fifth pay section, in Clear Fork limestone.

This little field, with productive limits around 3 sections long by 1½ to 2 sections in width, produced better than 134,000 bbl. from 56 wells in October 1957, the last month on which production figures were available from the Texas Railroad Commission.

New Discovery

New-pay discovery is Honolulu Oil Corp. 5-J Parker, situated 3 miles southeast of Andrews in Section 21, A-44 PSL Survey. Initial flowing potential from the Clear Fork was 844 bbl. of 34-gravity oil a day, based on an actual 17-hour flow test through ⅛-in. choke, from perforations at 7,564-79 ft. Operators had washed the section with 500 gal. of mud-acid. Flowing pressure was 325 psi.

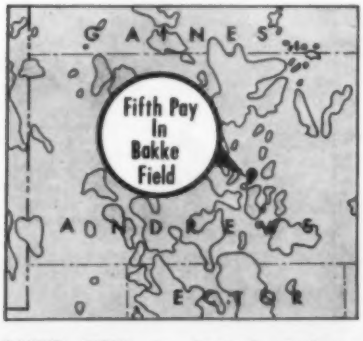
Like most other wells in the field, Honolulu's 5-J Parker was a dual completion. Initial potential from the Wolfcamp was 359 bbl. of 38-gravity oil a day through ⅛-in. choke, from perforations at 8,500-06 and 8,519-56 ft. Flowing pressure was 100 psi. on tubing.

Field openers . . . Bakke field was opened to Ellenburger and Devonian production in September 1956. Wolfcamp and Pennsylvanian pays were added before the year end.

W. E. Bakke 1 Grady, 5 miles southeast of Andrews, opened Ellenburger production flowing 1,022 bbl. of 43-gravity oil a day through ½-in. choke, from perforations at 12,312-53 ft. On ¼-in. choke, it flowed 1,308 bbl. a day from Devonian pay at 10,536-54 ft. and was finished as a dual discovery. This well also indicated production, while being drilled, from the shallower Wichita Albany and Clear Fork sections.

The same operator's 3 Grady, about 1 mile northwest of No. 1, opened Wolfcamp and Pennsylvanian production. Its potential from the Wolfcamp was 204 bbl. daily at 8,514-60 ft., and 276 bbl. a day from Pennsylvanian perforations at 8,956-87 and 9,008-14 ft. It also was a dual completion.

Bakke field is surrounded by similar production, but separated by structure. October 1957 status of the field was: Thirteen wells flowing and one on the pump in Devonian pay, having reported preduction of 36,455 bbl.; 14 flowing and 1 pumper in Ellenburger pay, with production of 52,188 bbl.; 15 flowing wells in the Pennsylvanian made 25,596 bbl., and 11 flowing wells and 1 pumper in the Wolfcamp section made 19,786 bbl., for a field total of 134,025 bbl. from 56 wells.



BAKKE FIELD in Central Andrews County added Clear Fork as the fifth pay zone.

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Money spent in Exploration and Development	$50,000,000	$450,000,000

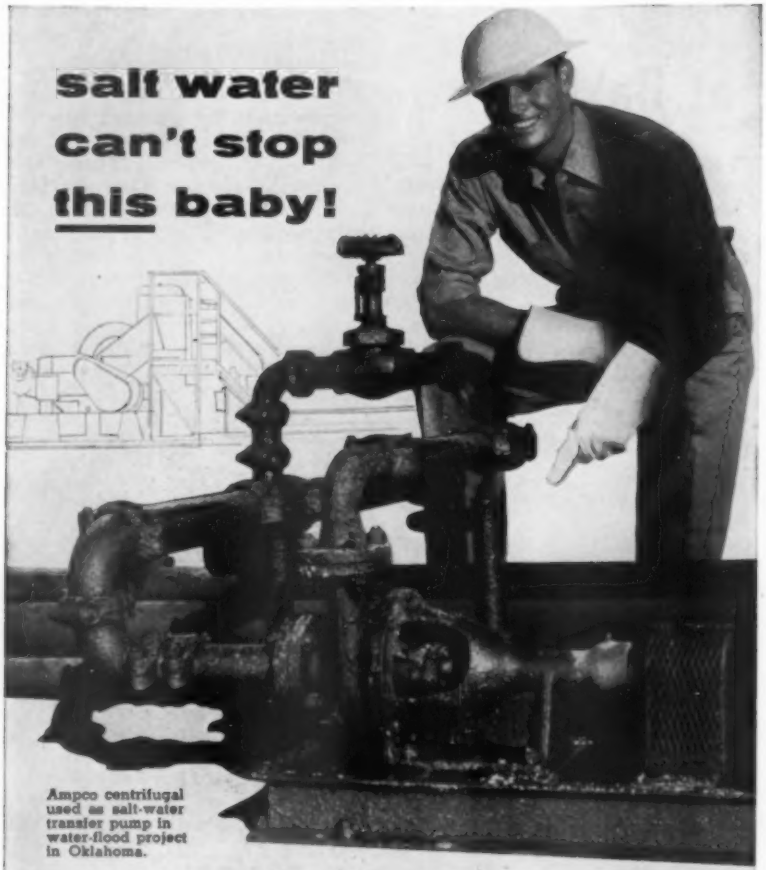
The discovery and production of oil has made Alberta one of Canada's richest provinces. The progress and development of secondary industry are reflected in an increased population — in the vigorous economy of Alberta.

Progress has created another great resource — opportunity. The development of this resource, together with the natural facilities for establishment, provides unlimited potential for secondary industry.

From the production of oil and natural gas has come progress and opportunity for industry to grow and prosper with Alberta.

For further information on Alberta oil and the establishment of secondary industry write, Richard Martland, Director, Industrial Development Branch, Legislative Building, Dept. T.O.J.58, Edmonton, Alberta, Canada.

GOVERNMENT OF
ALBERTA
DEPARTMENT OF ECONOMIC AFFAIRS
Hon. A. Russell Patrick, Minister
Ralph R. Moore, Deputy Minister



Ampco centrifugal used as salt-water transfer pump in water-flood project in Oklahoma.

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Salt-water disposal and flooding operations can't get too tough for an Ampco Pump. It's engineered to resist velocity, erosion, and corrosion.

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P-32

GULF COAST

Inactive South Allen Field Gets First Oil Production

South Alvin field, in Brazoria County, is being revived by a new dual-zone well completed by H. L. Hunt. The new well, inside Alvin townsite on the south side, and just northeast of two inactive wells comprising South Allen field, gives the field its first oil production.

The well, 2 Cty of Alvin Gas Unit 1, is completed with perforations at 9,822-28 ft. and 9,924-28 ft. Its oil production is from the upper zone, from which it flowed at the rate of 237.89 bbl. per day through 9/64-in. choke. Gravity of the oil is 32°. Gas-oil ratio is 475 cu. ft. per barrel, and pressure 1.325 psi.

The lower zone tested 2,015 M.c.f. of gas per day, also through 9/64-in. choke, recovering 10.6 bbl. of 46.4°-gravity condensate per 1 M.M.c.f. of gas. Flowing pressure from this zone is 3,486 psi.

The former two wells of the field were completed in the above sands but in both instances were gas productive.

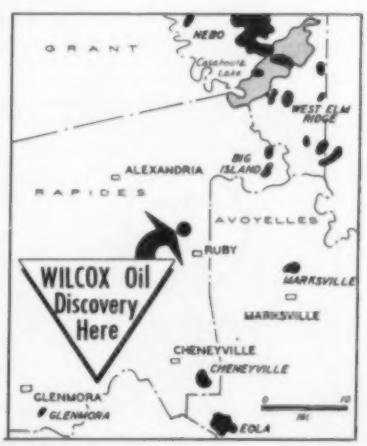
LOUISIANA

SOUTH

Blowout Delays Testing Rapids Parish Wildcat

Completion of Roger J. Bassett's indicated Wilcox discovery well 9 miles southeast of Alexandria, in Rapides Parish, is being delayed while operators clean up and move in another rig following a blowout and fire.

The well kicked, blew out, and



LOCATION of new indicated Wilcox oil discovery in Rapides Parish.

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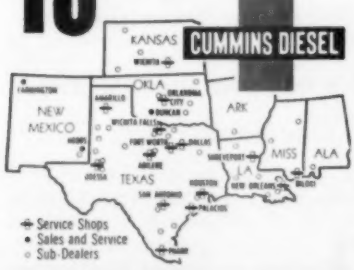

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Tips on Valves for Service Companies..

Ken Massey, Cardinal station manager, supervising sand frac job in West Texas. Note Rockwell-built Mudwonder valves on frac-head in background.

We maintain sand frac fluid pressure with Mudwonder Valves!

by Kenneth Massey,
Odessa Station Manager
Cardinal Chemical Company

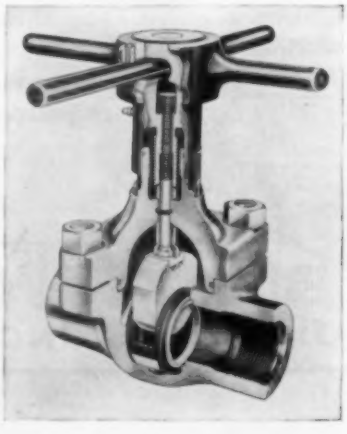
WE fracture oil wells. It's our job to get the maximum number of barrels pumped in the shortest possible time. That's why we use the best, most dependable equipment available—and drive it hard. When we finish pumping the sand frac fluid in under high pressure and close the well-head valves, we've got to be *sure* they don't leak. For two years now, we haven't had to worry. We find that well pressure never bleeds off when our Mudwonder valves are closed. There's no need to bump them shut or use a "cheater" to get drop-tight shut-off.

We now have 40 two-inch Mudwonders and several three-inchers. You might think maintenance would be a headache—but our Mudwonders don't seem to need much in the way of repairs. The only part that wears to any extent is the seat insert, which we can replace in a couple of minutes between jobs.

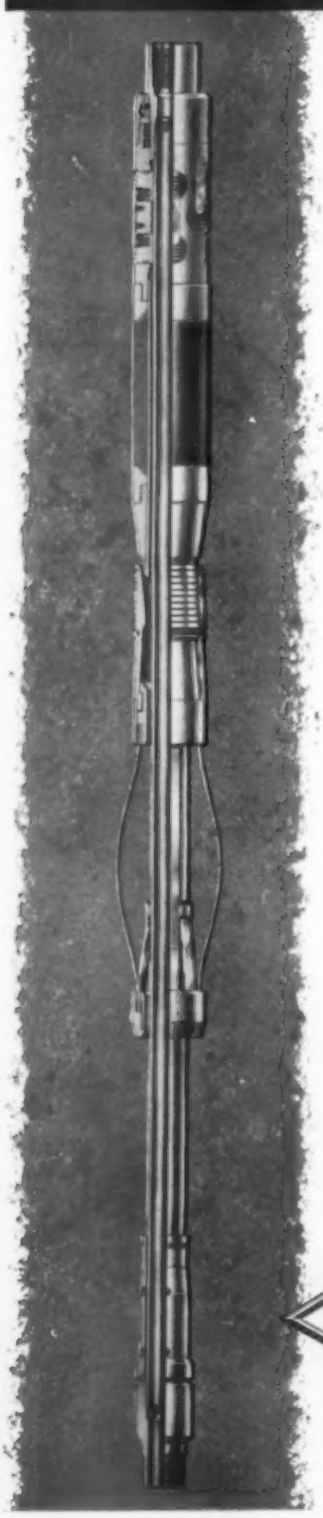
At the present time, we're using Mudwonders at all of our stations—Odessa and Levelland, Texas, and at Hobbs, New Mexico. We're thoroughly sold. Mudwonder valves are doing a great job for us, both on sand fracing and in acidizing.

Mudwonder valves are built in 2", 3" and 4" sizes; with screw or flange ends; for 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test) service. See your favorite oil field supply store, or write Edward Valves, Inc., East Chicago, Indiana, subsidiary of Rockwell Manufacturing Company.

Mudwonder cut-away view shows the one-piece seat insert, with Buna-N molded integrally over steel wear rings; chromed gate with "T" slot connection; separated stainless stem and double thread construction.



THE BROWN BOLL WEEVIL PACKER



RUGGED... DEPENDABLE

Here is a packer that is really made to do a tough job. Its sturdy, rugged design incorporates features that make this a highly desirable packer to use.

Rugged features—check 'em!

1. Built-in hydraulic hold-down — actuated by pressure *below* the packer. The hold-down slips are not exposed to fluids and solids in the tubing.
2. Built-in safety — if necessary, the stem may be unlatched from the packer providing a short stroke jar and a by-pass for circulation. Stem automatically relatches when setting back down.
3. Built-in strength — a tough compression type seal holds against the highest pressures. It can be set and reset numerous times with assurance that it *will hold.*
4. "Boll Weevil" setting and releasing features. Just pick up the tubing and set it down. No rotation or other tricky manipulation to set or pull the packer.
5. Full-opening, too!

Dependable applications—check 'em!

For high pressures of squeeze cementing, fracturing, acidizing and testing.

For selective treating, the "Boll Weevil" is ideal as top packer in a two packer hook-up. "Straddle" jobs are simplified with the unbeatable combination of the *Boll Weevil* and the *Brown BP-4* Bridging Plug Packer. Work easily above or below either packer, run them together, pull them together or leave them as production packers.

For any production job you have. It's especially suited to deep, crooked or deviated, high pressure wells.

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8490 KATY ROAD
HOUSTON, TEXAS

caught fire after being perforated for a squeeze-cementing job. Perforations were at 6,452-53 ft. in water sand. Salt-water flow killed the well, but fire damaged the rig.

Sidewall samples and electric log had indicated 8 ft. of oil sand at 6,442-50 ft. The showings were verified by a drill-stem test which recovered 840 ft. of oil and 240 ft. of oil and gas-cut mud. The test took in only 5 ft. of indicated pay at 6,443-48 ft. Tester was open 10 minutes through ⅝-in. bottom, and ¼-in. top choke.

The indicated discovery is in a rank wildcat test. Nearest production is 10½ miles northeast in Big Island field.

NORTH

Glen Rose Produces In Sicily Island Discovery

Austral Oil Exploration Co.'s newly completed Lower Cretaceous discovery well at Sicily Island in Catahoula Parish is rated good for 1,088 M.c.f. of gas per day, flowing through 7/32-in. choke.

The well, 1-A Tensas Delta, is productive from the Glen Rose section, perforated at 11,307-17 ft. It not only opens a deeper reservoir at Sicily Island, but its location is more than 75 miles from the nearest other Lower Cretaceous production in Simsboro field, Lincoln Parish.

Previous production at Sicily Island has been from the Upper Cretaceous-Tuscaloosa sands.

Simsboro field is northwest of Sicily Island. Nearest Lower Cretaceous in Mississippi is more than 80 miles northeast, at Bolton, in Hinds County.

The new discovery well was drilled by Austral as a joint operation with Crescent Production Co. It was drilled to 12,573 ft. Base of the Ferry Lake anhydrite was logged at 12,060 ft.

Flowing pressure through the 7/32-in. choke was 975 psi. Shut-in pressure is 4,850 ft.

Honore Gets Second Well

Gulf Oil Corp. is confirming its recent discovery of Pettet production at Honore, is Bossier Parish, by another small pumping well. It is the company's 1 Haynesville Mercantile, making 13 bbl. of 41.5°-gravity oil (net), plus 40 per cent water, from perforations at 5,644-50 ft. Location is 1,550 ft. northwest of the discovery well, completed last May, which is making 72 bbl. of net oil per day.

Five basins active as . . .

Rockies Tee Off on Big Program

THE PARADOX, Piceance Creek, Williston, Wind River, and Powder River basins are the current exploratory arenas in the Rockies.

Paradox . . . The Colorado portion of the Paradox basin may have its first commercial oil production at Hathaway, and Big Horn - Powder River Corp. 1 Government, a Montezuma County wildcat in SE SE SW 11-37n-20w.

The operators recovered 1,540 ft. of clean oil on a drill-stem test at 5,457-67 ft. in the Paradox-Pennsylvanian. Coring continues below 5,478 ft. at this significant wildcat prospect which lies just east of the Utah line

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and the Hatch Unit. Successful completion of this wildcat would open first commercial oil production in the Colorado portion of the Paradox basin.

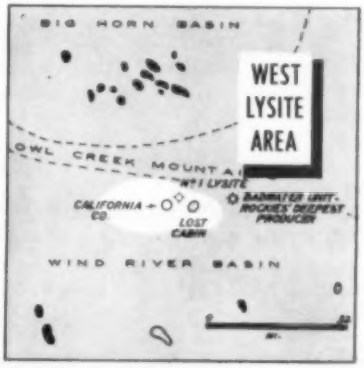
. . . In Utah. A big week in new locations for Utah was reported. Operators staked spots for 15 new wells, most of them in the Paradox basin.

Piceance Creek . . . Shell Oil Co. may have found the Weber-Pennsylvanian at its deep 1 Unit wildcat in Rio Blanco County, Colorado. The operator is running logs after reaching 14,345 ft. at the well in 17-2n-97w.

Shell reported previously shows of gas from upper zones and has set pipe to 10,383 ft. This is the deepest Weber try in this portion of Colorado since Phillips Petroleum Corp.'s record hole at the Mannel Unit. The well became the state's deepest hole at 17,033 ft.

Williston . . . Amerada Petroleum Corp. has come up with what is being called the most significant strike so far this year in the Williston basin. The 1 Shelvik, C NE SW 35-150n-97w, McKenzie County, North Dakota, is an indicated Silurian discovery off the west side of the Nesson anticline, 100 miles southeast of Montana's Outlook area and 6 miles southwest of Fancy Buttes field, a Mississippian producer.

The operator is drilling below 12,923 ft. after finding 1,755 ft. of clean oil on drill-stem test at 12,622-70 ft. in the Silurian. Amerada's Silurian prospect is of high importance due to its position off the anticline and also because it is the southernmost Silurian indication in Williston.



A NEW LOCATION in the West Lysite area of Fremont County gives new impetus to the increased interest in this area since the Lost Cabin pool discovery several weeks ago. The new well is The California Co. 1 State, 5 miles west of the Lost Cabin discovery well.

Wind River . . . A new wildcat has been located in the West Lysite area, Fremont County. The new well is The California Co. 1 State, NW NE SE 4-38n-91w, 5 miles west of the Lost Cabin field discovery well.

The company will go to about 12,000 ft. or the Mesaverde. California completed the Lost Cabin pool discovery, 1 Spratt, in two Upper Cretaceous zones . . . at 8,793-8,809 and 8,934-48 ft. That well flowed 8,275 M.c.f. of gas per day on completion. Location of this new producing area is in a highly faulted, remote wildcatting area on the north fringe of the Wind River basin, just south of the Owl Creek Mountains.

Sinclair-Wyoming Oil Co. drilled a dry hole at 1 Lysite Unit back in 1947. Total depth at that well was 12,587 ft. There were no shows of any kind. The original Lysite well is about 2 miles northeast of the new try at 1 State.

The West Lysite area is just a dozen miles southeast of Pure Oil Co.'s recent Badwater Unit gas discovery which opened deepest production in the entire Rocky Mountain region at 16,472 ft. in the Upper Cretaceous. The recent Lost Cabin discovery is considered one of the most important wildcat successes in Wyo-

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ming last year. The new well at 1 State will be watched closely.

Powder River basin . . . Pennsylvanian exploration on the east side of the Powder River basin in northeastern Wyoming is back in the news.

Skelly Oil Co. is running pipe at its 1 Government-Dunning in Crook County, 15 miles northeast of Donkey Creek-Minnelusa (Pennsylvanian) production. Total depth is 5,777 ft. Skelly will test shows in the Minnelusa topped at 5,677 ft.

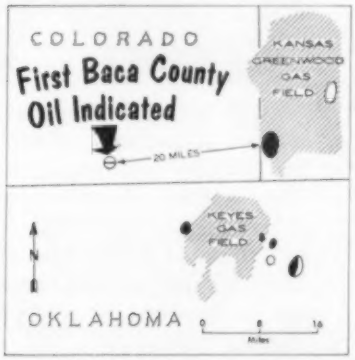
Another well on the east side of the basin, E. F. Carnell 2 Barton, 20 miles southeast of Skelly's well, found Minnelusa shows at 1,775-1,870 ft. The operator is running production string at 1,870 ft., total depth. This apparent strike is about 1 mile northeast of Cretaceous production at Barton field in Crook County.

Both wildcats are further evidence of the new trend toward Pennsylvanian exploration on the east and northeast sides of the Powder River basin.

Colorado's Baca County Gets Oil Prospect

Shell Oil Co. has found oil in the Des Moines - Pennsylvanian at its 1 Federal Land Bank, C SE NE 31-34s-44w, Baca County, promising first production of oil in the southeastern Colorado County.

The well flowed 1,400 M.c.f. of gas per day on a drill-stem test at 4,096-4,125 ft. and also oil, but no flow rate of the oil is reported. Location of this indicated strike is just north of the Oklahoma State line (Cimarron County) and 20 miles west of South Greenwood gas field in southwestern Kansas. The Greenwood gas area lops over into Colorado giving Baca County its only production. There has been no drilling within 6 miles of Shell's new prospect.



PENNSYLVANIAN oil flowed at a south-central Baca County wildcat in extreme southeastern Colorado. The indicated discovery, Shell Oil Co. 1 Federal Land Bank, would open first oil production in the county.

With Mississippi deep drilling

Diamond Field Goes Ahead

SOUTH MISSISSIPPI'S rapidly developing Diamond field, in Wayne County, added two more good oil producers last week. This makes three wells completed so far this year. They raise the total in the field to eight, and help to shape the field as one of the state's more important Lower Cretaceous discoveries.

Both of the new wells were drilled by Larco Drilling Co. and Durbin Bond & Co., joint operators who discovered the field last May. Both are dually completed wells. One, 1 Lee Beard, is productive from the field's deeper Hosston horizon, perforated at 10,707-20 ft., and its Glen Rose section, perforated at 9,243-50 ft. The other, 2 Gray, is productive from two zones in the

STEEL

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Tests are the proof of performance in a new product and the key to improvement in existing designs. This is why we have always considered test facilities to be an integral, working part of our design development program. But tests to be effective must not only simulate working conditions, they must also produce extremes for the study of equipment in unusual circumstances. In our test areas, actual oilfield conditions are stepped up beyond normal working limits to prove a point in design. Presently we are testing seven inch preventers for working pressures of 15,000 psi and ten inch preventers for 10,000 psi. Extremes in pressure, temperature and various phases of mechanical stress give the direction for designs to more than meet tomorrow's demands in any oil producing area. Innumerable tests of this type are part of Cameron's continuing design development program. Just such dedication to advancement has

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field Glen Rose horizon with perforations at 9,166-85 ft. and 9,355-67 ft.

The Beard well is rated good for 243 bbl. of oil per day from the upper zone, and 112 bbl. from the lower. The Gray well made 116 bbl. per day from the upper and 170 bbl. from the lower zone.

The former extends the field's productive limits about ¼ mile south. A Hosston well completed the previous week by Shell Oil Co. extended the field's productive limits more than a ¼ mile in the opposite direction. Shell's well, 1 Gray, is productive from perforations at 10,000-05 ft.

As one of the state's five Lower Cretaceous fields opened in 1957, Diamond now leads all of these in extent of development, number of wells completed to date, and in current activity. In number of wells, it already rates fifth among all of the state's currently producible Lower Cretaceous fields. Five rigs have been working in the field during recent months.

The field's eight wells include three completed by Larco Drilling Co. and Durbin Bond & Co., as joint operators; four by Shell Oil Co.; and one by Sun Oil Co. Four of the wells are dually completed, giving the field the equivalent of 12 wells.

Successful Wildcats

ALBERTA

Cabeen et al 9-9-39-20 Joffre, LSD 9, 9-39-26w4, TD 7,020 ft. Nisku oil well.

NORTH TEXAS

Jack County: Charles H. Kadane 1 Jamison, J. Gage Sur., A-1746, 6 miles north Jacksboro, ½ mile west gas production. IP 420 BOPD, 12/64-in., 44°-gravity, GOR 600, TP 350 psi., conglomerate 5,390-5,402 ft. TD 5,470 ft.

The Texas Co. 1 S. F. Borden estate, W. Elliott Sur., A-199, conglomerate pay discovery in Gilley-Caddo field. IP 193 BOPD, 24/64-in., 39°-gravity, GOR 1115, TP 300 psi., perfs. 5,902-06, 5,932-36 ft. TD 5,994 ft.

Montague County: Marshall Pipe & Supply Co. 1-A Petty, Rose Partridge Sur., A-1487, 2 miles north Bonita. IP 189 BOPD, 14/64-in., 41°-gravity, GOR 369, TP 250 psi., Bend conglomerate 5,452 ft. TD 5,458 ft.

Wilbarger County: Scholl & Keene 1 Waggoner estate "Q," 106-14-H&TC, A-1826, 12 mi. southeast Vernon, ¼ mi. west shallow production. IP 360 BOPD, 16/64-in., 39°-gravity, GOR 300, TP 125 psi., Caddo 3,818-28 ft. TD 4,163 ft.

Wise County: Christie, Mitchell & Mitchell 1 E. H. Smith, Blk. 25, Grayson CSL, A-329, 4 miles southeast Alvord. Old well recompleted. IP 111 BOPD, 16/64-in., 43°-gravity, GOR 860, TP 165 psi., Atoka conglomerate 5,745-49 ft. TD 6,304 ft.

Hamman Oil & Refining Co. 1 J. T. McDonald Unit, Sec. 2, Falls CSL Sur., A-293, 2 miles southwest Park Springs. IP 158 BOPD, 13/64-in., 42°-gravity, GOR 1975, TP 840 psi., conglomerate 5,680-90, 5,780-84 ft. TD 5,850 ft.

Lone Star Producing Co. 1 Tarrant County Water Board Unit 4, Cochran & Collins Sur., A-1348, 6 miles west Bridgeport. IPP 70 BOPD, 42°-gravity, GOR 157, Caddo conglomerate 4,891-96 ft. TD 5,779 ft.

Young County, C & H Oil Co. 1 Deats, A. M. Hull Sur., A-1731, 9 miles southeast Graham. IP 89 BOPD, 12/64-in., 43°-gravity, GOR 418, TP (?), Strawn 2,126-28 ft. TD 4,870 ft.

Stephens Oil & Gas Corp. 1 Effie Young, J. D. Rice Sur., A-1630, 3 miles northeast South Bend, ¼ mile northwest 3,640-ft. production. IP 162 BOPD, 12/64-in., 43°-gravity, GOR 986, TP 1,400 psi., Ellenburger 4,528 ft. TD 4,535 ft.

The Texas Co. 1 T. G. Price, M. Edwards Sur., A-91, 12 miles southwest Graham, 1 mile east Mississippian production. IP 360 BOPD, 18/64-in., 44°-gravity, GOR 780, TP 500 psi., Mississippian 4,410-26 ft. TD 4,500 ft.

TEXAS GULF COAST

Kleberg County: John B. Hawley 2 Allan East et al, Sec. 41, Kleberg Town & Improvement Co. Subd. IP 126 BOPD, 5/32-in., 36°, GOR 200 cu. ft. per barrel, TP 160 psi., perfs. 3,001-06 ft. (Catahoula). TD 3,530 ft. (New pay in Ricardo field.)

Lavaca County: D. W. Pickett 1 Neuhaus (OWWO), Thomas Bridges Sur., A-80 (7½ miles southeast of Hope). IP 62,000 M.c.f. daily, absolute open-flow potential, dry gas, shut-in TP 1,355 psi., perfs. 3,092-97 ft. (Frio). TD 3,139 ft.

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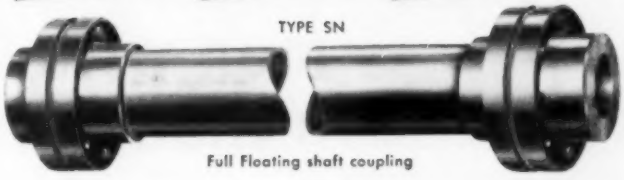

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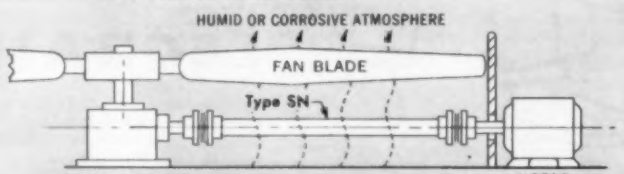

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(New shallow pay in Chicolete Creek field.)

North Central Oil Corp. 1 Braunig & Shall, Sarah Williams Sur., A-492 (2½ miles southwest of Speaks). IP 9,900 M.c.f. daily, absolute open-flow potential, GLR 18 M.c.f. per barrel, 53.4°, shut-in TP 2,859 psi., perfs. 8,800-18 ft. (Wilcox). TD 9,605 ft. (New field.)

Liberty County: Kilroy Co. of Texas, Inc., and Harry Hurt 1 Wildi, 8. L. Carroll Sur. 35, A-743 (8 miles southwest of Nome). IP 11,500 M.c.f. daily, absolute open-flow potential, GLR 29.62 M.c.f. per barrel, 60.8°, perfs. 8,574-80 ft. TD 8,588 ft. (New reservoir 1¾ miles southeast of Cottonwood field.)

Montgomery County: Michel T. Halbouty 1-A Foster, M. B. Lawrence League, A-310 (2 miles south of Fostoria). IP 3,600 M.c.f. daily, GLR 19.2 M.c.f. per barrel, 52°, shut-in TP 3,805 psi., perfs 10,879½-91½ ft. (Wilcox). TD 10,903 ft. (New field—4 miles northeast of Splendora field.)

Nueces County: Engeo Oil & Gas Co. 1 Meincholdt, Lott X111, George H. Paul Roman Numeral Subd. (2 miles northwest of Robstown). Shut-in gas well, no gage, perf. in 3,600-ft. zone. TD 4,002 ft. (New pay off northwest side of Robstown field.)

Refugio County: Union Oil Co. of California 1-B Audrey Baumgartner et al, Santiago Serba Sur., A-66 (.9 mile northwest of Refugio). IP 165,000 Mc.f. daily, open-flow potential, GLR 57.84 M.c.f. per barrel, 62.7°, shut-in TP. 2.503 psi., perfs. 6,850-59 ft. (Lower Frio). TD 8,000 ft. (New field—North Greta.)

San Patricio County: Houston Natural Gas Producing Co. 1 Fay, Lot 5, Sec. 76, G. H. Paul Subd., Coleman-Fulton Pasture Co. Lands, R. Eggleston Sur., A-116. IP. 500 M.c.f. daily, ⅛-in., 118 BC per M.M.c.f., shut-in TP. 4,000 psi., perfs. 9,802½-18 ft. (Frio). TD 9,890 ft. (New pay in Commonwealth field.)

Victoria County: Harkins & Co. 1 Dreyer-Lassman-Gisler Unit, Milton H. Hardy Sur., A-174 (1 mile west of Mission Valley). IP 4,400 M.c.f. daily, absolute open-flow potential, GLR 66.7 M.c.f. per barrel, 56°, shut-in TP. 3,135 psi., perfs. 8,760-70 ft. (Second Massive Wilcox), and 3,750 M.c.f. daily, absolute open-flow potential, GLR 33 M.c.f. per barrel, 56°, shut-in CP 2,896 psi., perfs. 8,654-64 ft. (First Massive Wilcox). TD 9,216 ft. (New field.)

Wharton County: Northern Pump Co. 1 Irwin Don Meyers, E. C. Ogden Sur. 30, A-544 (4 miles southwest of El Campo). IP 10,200 M.c.f. daily, absolute open-flow potential, GLR 200 M.c.f. per barrel, 60°, shut-in TP 2,150 psi., perfs. 5,554-60 ft. TD 5,727 ft. (New pay in East Hillje field.)

MISSISSIPPI

Adams County: Everett Truly, Trustee, 1-A Byrnes, 16-5n-3w. IP 109 BOPD, 9/64-in., 40°, TP 340 psi., perfs. 6,518-20 ft. (Wilcox). TD 6,810 ft. Elev. 124 ft., Wilcox 4,600 ft, base Baker shale 6,405 ft., Minter zone 6,704 ft. (Extends Ellis Cliffs field.)

MICHIGAN

Mason County: Miller Brothers 1 Harmon SW SE SE 10-17n-17w, Riverton Township, 5 miles north Pentwater field. IP after acid 20 bbl. oil day. Elev. 695 ft., Traverse lime 1,647 ft., pay 1,650 52 ft. TD 1,667 ft. (New oil pool.)

SOUTH LOUISIANA

Lafourche Parish: Union Oil & Gas Corp. of Louisiana 1 Bowie, 29-13s-17e, IP 215 BOPD (net), 15 per cent b.s. and w., 2,200 M.c.f. daily, ⅛-in., 41.1°, TP 8,300 psi., perfs. 12,335-50 ft. and 12,370-12,410 ft TD 14,027 ft. (New field—3 miles southwest of lower Vacherie field.)

Chacahoula Oil & Gas, Ltd., 1 Southdown, 22-14s-16e. IP 943 M.c.f. daily, and 3 BOPD, 3/32-in., 57°, TP 3,600 psi., perfs. 12,582-88 ft. TD. 14,295 ft. (Extension and new pay in St. John field—1 mile northeast of discovery well.)

Plaquemines Parish: Shell Oil Co. 4 Shell-Calco-U.S.A., Township 25s-30e (no section). IP 185 BOPD, 3/32-in., 32°, GOR 815 cu. ft. per barrel, TP 2,450 ft., perfs. 9,857-85 ft. TD 10,597 ft. (New pay in Burwood field.)

LOUISIANA OFFSHORE

Plaquemines Parish: Continental Oil Co. (operator for C. A. T. C. group) 3-A OCS-O146, Blk. 58, West Delta area, Gulf of Mexico. IP 540 BOPD, 7/32-in., 43.5°, GLR 8,148 cu. ft. per barrel, TP 8,250 ft., perfs. 14,182-14,200 ft. TD 15,225 ft. (New pay in West Delta Block 58 field.)

Terrebonne Parish: Shell Oil Co. 1-E Continental, 19-17s-14e (2¼ miles north of Turtle Bayou field). TP 4,500 M.c.f. daily and 16 BCPD, 15/64-in., 48°, TP 4,000 psi., perfs. 14,158-68 ft. TD 14,276 ft. (New field.)

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Calco Picks Gosline as V.P.

. . . and assistant to president. He's a man with plenty of production experience and is a former college professor.

JAMES E. GOSLINE, a Ph. D. who quit the academic life 25 years ago for the livelier oil business, is moving into a top executive job with The California Co.

Gosline has been named director, vice president, and assistant to the president of Calco, producing subsidiary of Standard Oil Co. of California.

Forty-nine-year-old Jim Gosline is a first-rate choice for the No. 2 job in fast-growing Calco, which headquarters at New Orleans. He has acquired a quarter-century of production engineering experience in addition to his doctorate in engineering at the University of California.

Though a Californian most of his life, Gosline was born at Carnegie, Pa. He moved early to Santa Paula in the California oil country. He attended public schools at Santa Paula and then the University of California.

He taught mechanical engineering and did academic research on hydraulic pump theory at the University of California before joining California Standard in 1933 as an engineer in the San Francisco office.

By 1942 Gosline had moved up to supervising petroleum engineer in charge of production problems. A year later he was manager of California Standard's southern producing district in Los Angeles. Then, in 1947, he was named assistant manager of the producing department and, in 1954, general manager.

Last October Gosline was pulled off his manager's job for a short stint as special producing consultant — just long enough to get the feel of the company's operations outside the West.

JAMES E. GOSLINE

. . . new face at The California Co.

Then came the appointment to his new job.

Gosline will serve under Calco President H. C. Teasdel. He succeeds E. M. Kipp, who was transferred early this month to the executive staff of California Standard at San Francisco.

A husky man who likes to hunt and fish, Gosline has an outgoing personality and a reputation for getting things done. In his new assignment he will be responsible for personnel, transport and safety, and will handle liaison work with the company's producing components on the Gulf Coast and onshore as far north and west as Colorado and Wyoming.

Personals

Robert I. Williams, regional manager in Denver for Lion Oil Division of Monsanto Chemical Co., has been promoted to director of regions, production and exploration department. He will headquarter in Houston.

W. K. Savage, supervisor of light-oil processing at The Texas Co.'s Port Arthur, Tex., refinery, has been appointed assistant superintendent, manufacturing division, light-oil processing. **R. N. Ludwig,** assistant supervisor of light-oil processing, will replace Savage. Ludwig will be succeeded by **T. H. Tepper.**

Vincent J. Sikora has joined Atlantic Refining Co. in Dallas as reservoir engineer.

Kenneth Cervenka, formerly with Shell Oil Co., has joined Tekoil Corp. as head of the company's Midland, Tex., operations office.

H. C. McCarver, formerly assistant vice president in charge of exploration and assistant manager of Seaboard Oil Co.'s Mid-Continent exploration division at Dallas, has been named manager of exploration for Seaboard. He replaces **R. A. Stehr,** who asked to be relieved of the position due to ill health. Stehr will continue to serve the company, however, as special adviser to the exploration department.

J. Randolph Buck, Dallas consultant, has joined Northern Natural Gas Co. in Omaha as senior reserves engineer in the reserves and availability section, gas supply department.

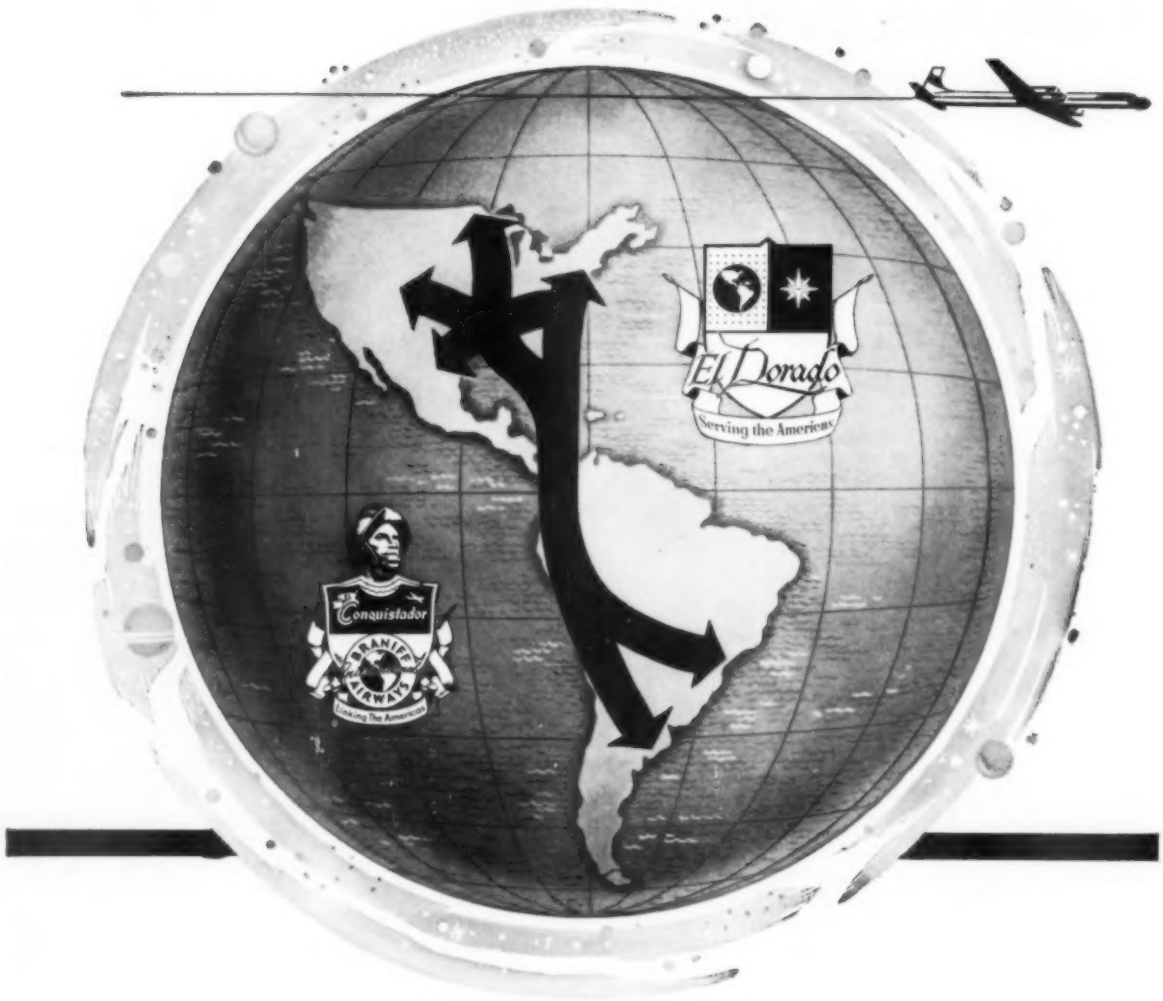
L. H. Riley and **John Paul Nolley,** district production superintendents for Humble Oil & Refining Co. at New Iberia, La., and McCamey, Tex., respectively, have swapped jobs. Riley now becomes superintendent at McCamey, Nolley at New Iberia.

A. B. Dilworth, M. L. Mead, and **Larry Shomaker,** vice presidents of Northern Natural Gas Co., have been advanced to senior vice presidents. They will serve as the executive and policy committee for the company's management board.

Dr. Champion Herbert Mathewson, professor emeritus of metallurgy and metallography at Yale University and a former president of AIME; **Donald H. McLaughlin,** president of Homestake Mining Co.; and **Fred Searls, Jr.,** president of the board of Newmont Mining Corp., have been elected to honorary membership by AIME. The three will be cited for outstanding achievements February 19 at the annual AIME banquet in New York.

Jerry B. Frost, Robert K. Klockmann, and **Buell O'Connor,** chemists, have been assigned to American Oil Co.'s research and development in Texas City. They were formerly at Amoco Chemical Corp.'s Brownsville, Tex., plant, which was recently closed. Also assigned to Texas City from Brownsville are **Joe F. Alix, John J. Hagan, William F. Patton, Bobby D. Sager, Donald J. Shrecengost,** and **W. Gordon Thomson,** chemical engineers.

John D. Moody, manager of Gulf Oil Corp.'s West Texas exploration and production district at Midland, Tex., has been promoted to exploration adviser at the company's general offices at Pittsburgh. **Ernest E. Merkt,** new division petroleum engineer at Fort Worth, will replace Moody as district manager at Midland. **H. P. Reardon,** division reservoir engineer, becomes acting division petroleum engineer at Fort Worth, and **J. L. Ross,** reservoir engineer, becomes acting division reservoir engineer. **B. E. Thompson** has been promoted from division production coordinator to division production adviser at Fort Worth. **Eugene Hosford,** district manager at Roswell, N. M., becomes division production coordinator at Fort Worth. And **W. A. Shellshear** moves from district manager at Houston to district manager at Roswell.



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T. B. KIMBALL

J. A. AHEARN

Sinclair Refining Shifts Executives

Six Sinclair Refining Co. executives will take over new jobs as the parent Sinclair Oil Corp. promotes top officials of the refining subsidiary. James E. Dyer, president of Sinclair Refining since 1954, has been elected vice chairman of the board of Sinclair Oil Corp., a new position. Dyer has been a vice president of the parent company since 1951.

Thomas B. Kimball, executive vice president and director of manufacturing for Sinclair Refining, will succeed Dyer as president. James A. Ahearn, vice president and executive assistant to the president, Sinclair Refining, moves up to executive vice president replacing Kimball.

In other changes in the refining subsidiary, W. Vaughn Ischie, vice president and a director, succeeds Kimball as director of manufacturing. E. W. Griscom becomes vice president, director, and general manager of manufacturing succeeding Ischie. R. E. Howe, formerly manager of processing and planning in the manufacturing department has been named vice president and executive assistant to the president succeeding Ahearn.

B. E. Crowder, district production superintendent with Humble Oil & Refining Co., has been transferred to Grand Isle, La., from Crowley, La.

E. D. Whitis, coordinator of land, geological, and production activities for Ada Oil Co., has been appointed vice president, oil and gas division.

Olin Culberson, veteran member of the Texas Railroad Commission, has announced as a candidate for another 6-year term. Culberson now is in his eighteenth year as a commission member and currently is serving as chairman.

J. Roy Gordon, executive vice president and a director of International Nickel Co. of Canada, Ltd., and International Nickel Co., Inc., and recent winner of the AIME's James Douglas Gold Medal for 1958, has been elected a director of Babcock & Wilcox Co.

Roland A. Whealy, formerly with Ashland Oil & Refining Co. for over 20 years, has been named refining technologist in the Interior Department's Office of Oil and Gas. He will be on the staff of **Carroll D. Fentress,** assistant director, and will be responsible for programs involving refining, synthetic fuels, and natural gasoline.

C. V. Cameron has been advanced by Shell Oil Co. from Houston division exploitation engineer to Houston area chief exploitation engineer. He replaces **H. J. W. ten Broeke,** who has been given a foreign assignment.

Jack W. Hudson, formerly vice president and general manager of Tri-Province Drilling Co., has joined Britalta Petroleums, Ltd., as vice president in charge of field operations and engineering.

Ernest R. Shearer, assistant superintendent of Buckeye Pipe Line Co.'s Cygnet division, Lima, Ohio, has been appointed superintendent of the Midwest products division, Lima. **Charles W. Tomford,** formerly superintendent of the Midwest products division, has been named manager of the planning and development department, Lima.

R. J. Field, formerly Houston district land and exploration superintendent for Sohio Petroleum Co., has been transferred to the division office in Houston as staff assistant to the exploration manager. **L. L. Fergus,** formerly staff assistant to the exploration manager, has been named district landman in Houston. Fergus succeeds **C. E. Storm, Jr.,** who has been transferred to the division office as assistant division landman.

Personals

Ronald W. Lockhart, formerly process engineer at Esso Standard Oil Co.'s Baltimore refinery, has been transferred to Carter Oil Co. as process engineer in Billings, Mont.

M. G. Crain has been transferred by Superior Oil Co. from Houston, where he was reservoir engineer, to Lafayette, La., as production engineer.

J. Marston Linehan, president of Mid-Continent Pipe Line Co. since 1947, has been elected a vice president and manager of crude-oil supply and transportation for Sunray Mid-Continent Oil Co. and its subsidiary, D-X Sunray Oil Co. Linehan also was elected a director of D-X Sunray. **Walter E. Biery,** vice president and general manager of Mid-Continent Pipe Line, moves up to succeed Linehan as president. **I. H. Hughes,** a vice

J. M. LINEHAN

W. E. BIERY

president of Sunray Mid-Continent, has been elected a vice president of D-X Sunray and will be manager of administrative functions for the two companies. In other changes, Biery, **O. E. Bryant,** manager of field operations for Mid-Continent; **Fred E. Pyeatt, Jr.,** manager of engineering; **M. C. Jones,** manager of crude-oil traffic; and **J. H. Woodard,** D-X Sunray, were named to the Mid-Continent Pipe Line board.

Roy Willcockson, Billings, Mont., district exploration superintendent for Pan American Petroleum Corp., has been transferred to Houston. Pan Am's Billings office will close February 1. Transferring from Billings to Bismarck, N. D., will be **Tom Hull,** district geologist; **Eric Thompson,** geologist; **Bob Zieve,** geophysicist; **Andrew Matchett** and **Robert Milliken,** landmen. **Willis Alderman, Charles Devendorf, Carl Lein, Jerry Zoble,** and **Douglas Powell,** geologists, will transfer to Casper, Wyo. **Lou Gaskins,** landman, has been moved to Salt Lake City. **William Stubbs,** district landman, and **James Savier,** scout, will remain in Billings.

Personals

Paul H. Arnot, general manager, operations, for Arabian American Oil Co., and **Robert S. Hatch,** general manager, materials supply and traffic, have been elected Aramco vice presidents. Arnot will continue as general manager, operations. Three Aramco veterans will retire this year. They are **J. C. Stirton,** vice president,

P. H. ARNOT

R. S. HATCH

engineering and construction; **F. W. Ohliger,** director and vice president; and **James Terry Duce,** vice president, government relations. **W. R. Cooper,** vice president and chief engineer of Aramco Overseas Co., an affiliate, will become general manager, engineering and construction in Dhahran for Aramco and will succeed Stirton as a director. Duce will be succeeded after midyear by **Garry Owen,** vice president, concession affairs, who will be transferred to the United States. **Robert I. Brougham,** vice president, finance, will take over concession affairs replacing Owen. **L. M. Snyder,** Aramco vice president, operations, has been named vice president, engineering, construction, and local sales. Snyder was named chairman and chief executive officer of Aramco Overseas last week. He exchanged roles with **Norman Hardy,** Aramco president, who became AOC vice chairman. **Fred A. Davies,** Aramco chairman, has been elected to the AOC board.

M. A. Schneider has been named executive vice president and general manager of Pure Fuel Oil Co., subsidiary of Pure Oil Co. Schneider has been vice president of the company since 1954.

Damon Holditch, manager of Lone Star Producing Co.'s South Louisiana exploration district, has been appointed manager of South Texas exploration district. He will headquarter in San Antonio. Holditch succeeds **John A. Cochran,** recently transferred to Abilene as head of West Central Texas exploration. Holditch will be succeeded by **J. K. Liles,** formerly South Louisiana district geologist.

James R. Teel has been promoted by Skelly Oil Co. from petroleum engineer in Tulsa to assistant district superintendent in Velma, Okla.

Joseph M. Clark, Tulsa consulting geologist, has joined Arkansas-Western Gas Co., Fayetteville, Ark., as geologist. Clark was with Tidewater before becoming a consultant.

E. W. Hale has been named chief operator - deliveryman at Imperial, Calif., for Southern Pacific Pipe Lines, Inc.

E. E. Byrd, district superintendent, has been transferred to Crowley, La., from Thompsons, Tex., by Humble Oil & Refining Co.

Varnum B. Steinbaugh has been elected president of American Natural Gas Production Co., new exploration and production subsidiary of American Natural Gas Co. **S. A. Womack, Jr.,** has been named manager of operations for the subsidiary.

George Echols, scout for Standard Oil Co. of Texas in Tyler, Tex., has been elected 1958 president of the National Oil Scouts and Landmen's Association. Other officers are **Walter Holley,** Monsanto Chemical Co., Lion Oil Division, Shreveport, La., first vice president; **J. B. Johnson,** Sohio Petroleum Co., Oklahoma City, second vice president; **Charles R. Kelly,** Sun Oil Co., Bismarck, N. D., third vice president; and **Daniel Greene,** Magnolia Petroleum Co., Mount Vernon, Ill., secretary-treasurer. **George B. Ross,** Humble Oil & Refining Co., Midland, Tex., is editor-in-chief. **Kelly Scott,** Superior Oil Co., Houston, immediate past president of the association, will serve on the executive board.

K. E. CHAFFIN

Kenneth E. Chaffin, superintendent of offshore operations for Loffland Brothers Co. for the past 3 years, has been named general superintendent of the Louisiana-South Texas division. He succeeds the late George C. Mallory. Loffland has also promoted **D. E. Williams,** superintendent of inland barge operations in the Louisiana-South Texas division, to assistant general super-

D. E. WILLIAMS

P. L. WAID

intendent of the division. Williams was superintendent of Loffland operations in eastern Venezuela before transferring to the Louisiana-South Texas division in 1956. Both Chaffin and Williams will headquarter in New Iberia, La. Loffland has also promoted **Paul L. Waid,** tool pusher, to assistant superintendent of operations for Loffland Brothers Co. of Canada. He will headquarter in Calgary.

G. K. Elias, zone geologist, and **R. C. Perry,** geologist, in Gulf Oil Co.'s Durango, Colo., exploration office, have been transferred to Turkish Gulf Oil Co., new Gulf subsidiary. **W. F. Auer,** staff geologist in Denver, has been named zone geologist at Durango replacing Elias.

DEATHS

Norman M. Jones, 62, consulting engineer with Arcole Midwest Corp., and formerly sales manager with Standard Oil Co. of California and chief field engineer with Macmillan Petroleum Corp., died January 8 in South Pasadena, Calif.

James C. Foster, pioneer in pipeline welding with the Sinclair Prairie Pipeline Co., died January 8 in Bartlesville, Okla. Foster was also with Phillips Petroleum Co. at one time.

Benjamin Bradley, 67, retired assistant pipeline department foreman for D-X Sunray Oil Co., died January 9 in Tulsa.

Andrew K. Brumbaugh, an assistant manager of the refinery engineering division of Socony Mobil Oil Co., Inc., died January 10. He was 47.

Gen. James Gordon Steese, 75, retired U. S. Army brigadier general and civil engineer, died recently in a Bangui, French Equatorial Africa, hospital after an automobile accident. One-time assistant chief engineer for the Panama Canal Zone and the builder of Alaska's first railroad, Gen. Steese was general agent for South American Gulf Oil Co. in Colombia from 1927 to 1931. He later acted as a consultant for Gulf on various occasions. He retired in 1947.

Selecting A Motor Drive For A Hazardous Area?

Here's how

TEIGF motors
by E-M
provide safe, dependable, economical power

Faced with the problem of driving hydrogen compressors in atmospheres which might contain hydrocarbons at their Baltimore refinery, engineers of Esso Standard Oil Company turned to TEIGF (Totally Enclosed Inert Gas Filled) Motors. Horsepower requirements exceeded the practicable limits under which explosion-proof motors could be used.

An important consideration was getting the greatest possible drive economy while operating safely in a possible hydrogen atmosphere. Three E-M 350 hp, 390 rpm TEIGF Motors are on duty at Esso Standard Oil Company fulfilling these important qualifications.

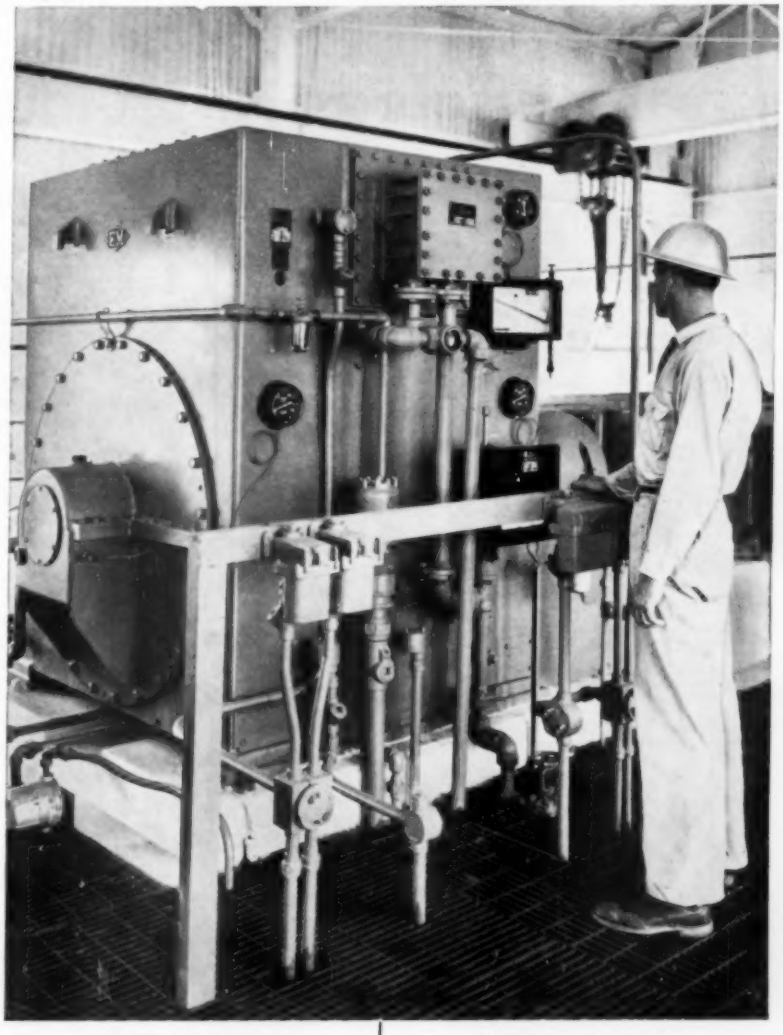
For Esso Standard Oil Company and other companies with similar problems, these E-M Motors offer three main groups of advantages:

1. SAFETY — Within the motor enclosure, inert gas pressure above atmospheric keeps explosive hydrogen *out*. A series of features help accomplish complete safety . . . inert gas pressure gauges . . . temperature gauges . . . purging valves, etc. and a full line of optional equipment. The E-M TEIGF Motor can be "customized" to meet your needs exactly.

2. RUGGED DEPENDABILITY. E-M uses specially designed "box type" frames of heavy-duty plate steel reinforced with heavy bar-stock ribs. They cannot twist or distort. Air gap is accurate and permanent, as all frame welding is completed before precision boring. Ventilating gas passages are carefully engineered to provide unimpeded gas flow for optimum cooling.

3. ECONOMICAL OPERATION. In E-M TEIGF Motors, gas loss is lower than commercially accepted standards. Specially designed shaft seals are oil-pressure gas-sealed bearing type, virtually non-wearing. Where bolts enter outside casing, E-M engineers specify blind holes . . . tapping and drilling are done *into* casing, not through. Operating and maintenance costs are at a minimum.

Consult your nearest E-M sales engineer, or write the factory for TEIGF Motor Bulletin No. 226.



TYPICAL STANDARD FEATURES INCLUDE:

1. Top-mounted gas-to-water cooler for use with suitable cooling water supply.
2. Forced-feed lubricated bearings and oil-pressure gas seals.
3. Oil pump, motor and oil filter. (Can be supplied optionally inside enclosure.)
4. Inert-gas temperature gauge.
5. Inert-gas pressure gauge.

(additional features shown in Bulletin No. 226)

TYPICAL OPTIONAL FEATURES INCLUDE:

1. Water cooler with double-tube construction for added protection against leakage.
2. Liquid level detector switch. Accumulation of moisture within motor sounds alarm or shuts down motor.
3. Bearing temperature relays, to sound alarm or shut down motor.
4. Explosion-proof motor terminal pothead or inert-gas filled terminal box.
5. Water flow indicator. Can be adapted for use with pneumatic-type regulating device.

E-M
1300—TPA—2179

ELECTRIC MACHINERY MFG. COMPANY
MINNEAPOLIS 13, MINNESOTA

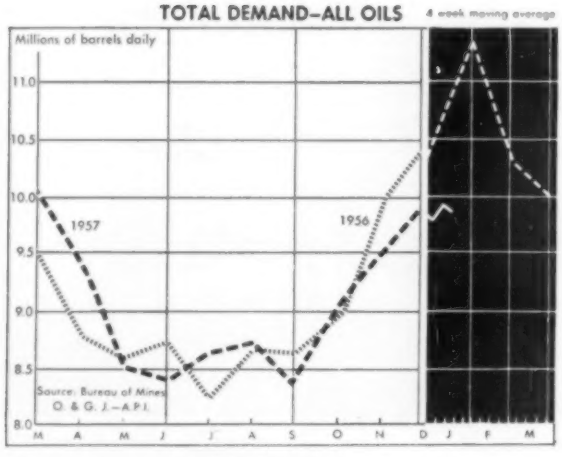
Specialists in making motors do
EXACTLY WHAT YOU WANT THEM TO

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,922,285	UP	55,260	DOWN	584,689
Crude stocks	276,737,000	DOWN	262,000	UP	17,080,000
Completions	1,118	DOWN	*285	UP	36
Refinery runs	7,675,000	DOWN	97,000	DOWN	445,000
Gasoline stocks	200,636,000	UP	1,898,000	UP	9,263,000
Kerosine stocks	25,343,000	DOWN	1,918,000	DOWN	2,199,000
Distillate stocks	135,406,000	DOWN	5,943,000	UP	20,982,000
Residual stocks	57,952,000	DOWN	305,000	UP	16,943,000
Four-product stocks	419,337,000	DOWN	6,268,000	UP	44,989,000
Total imports	1,361,400	DOWN	25,000	UP	332,500

*Data for January 11 included more than 1 week.



Discounting Distillate Prices Started Early This Season

THE WEATHER has not been cold enough this winter to maintain normal prices for light and heavy fuel oils. The softening trend seems to be spreading to the North Central market areas where prices have been low but reasonably steady so far this season.

Not only did the East Coast advance by Socony Mobil Oil Co. earlier this month fail to hold, but discounts are coming out in the open. Prices on the Gulf Coast have been soft all season. This softness now is showing more influence on inland and East Coast markets.

More of these under-the-market prices will tend to become quoted prices after the first of February unless the high-demand areas have very cold weather over the next few weeks. Here is the reason.

Both refiners and secondary suppliers start keeping a closer watch on heating-oil inventories after the first of February or at least by the middle of that month. Neither wants to be caught with heavy inventories at the end of the season. Even home owners tend to run their storage tanks low after the first of March.

A refiner who wants to make a substantial reduction in his stocks in December or early January may be able to find a large unbranded distributor who is willing to gamble on the weather and take a big slug of distillate. After the middle of February, the chance of getting caught with some of the material at the end of the season goes up. The distributor either will turn down the offer or bid low enough to cover the change in odds after he passes the halfway point of the heating season.

If the refiner can't work off excessive heating-oil inventories through deals for large volumes, he can try for smaller direct sales at low prices. Quotations for these small sales tend to become the going prices.

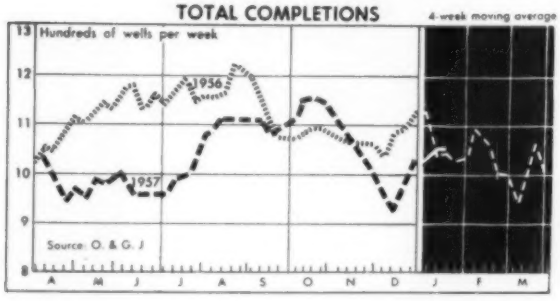
Price increases for distillate fuel are rare after the first of February. Refiners raised quotations last year in January and February following the crude-price increase, but the new prices did not last very long.

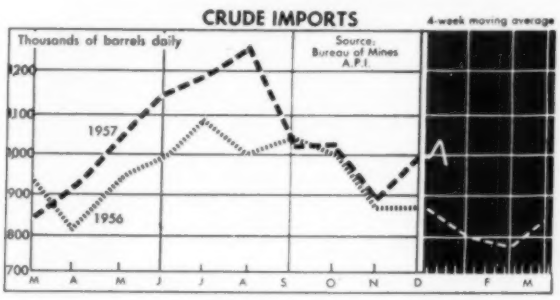
Here are trends for important areas. In the Group 3 area, No. 2 fuel was selling for 9.25 cents a gallon before the crude price increase in January last year. The low moved up to 9.65 cents late last in January but is down to 8.875 cents this January.

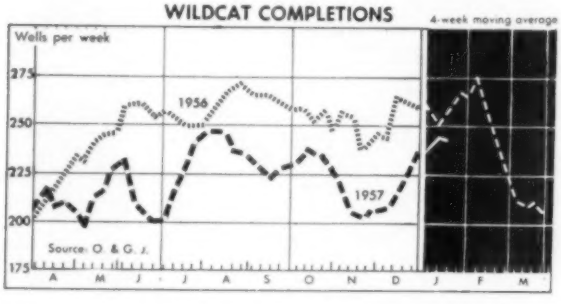
The No. 2 cargo prices on the Gulf Coast were 9.25 cents before the crude increase and 10.25 cents after the increase. You would be flooded with fuel today if you offered 8.75 cents. The low is about 8.5 cents.

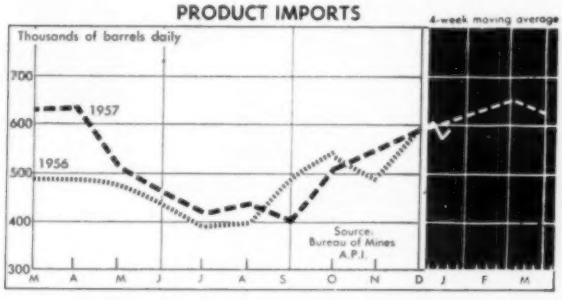
The barge price in New York Harbor went from 10.65 cents to 11.65 cents in January 1957. The current price is 10.05 cents.

It will take very severe weather to set the stage for a price increase this season.







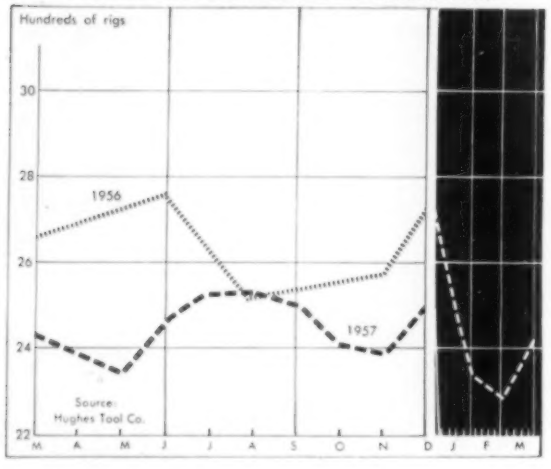


WEEKLY WELL COMPLETIONS . . . WEEK ENDED JANUARY 18, 1958

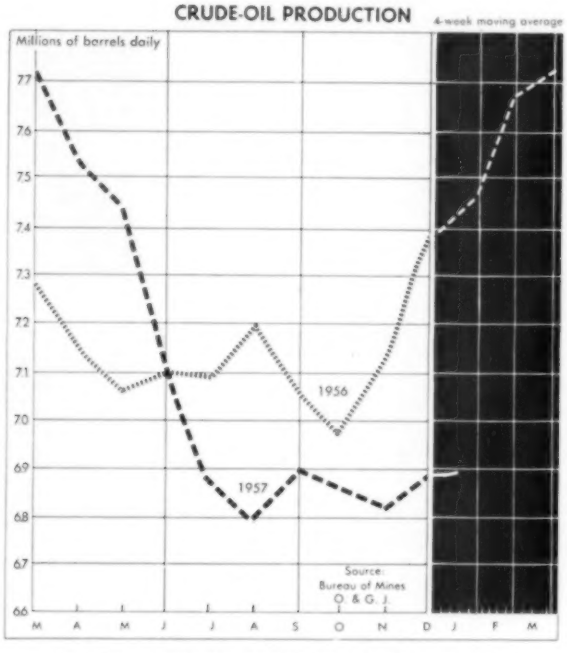
	Total wells							Cumulative		Total wildcats					Cumulative	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1958	1957	Total	Crude	Cond.	Gas	Dry	1958	1957
Alabama	2	2	0	0	0	0	23,020	6	1	0	0	0	0	0	2	1
Arkansas	28	20	0	0	8	0	79,465	53	61	5	1	0	0	4	9	8
California	50	34	0	1	15	0	183,331	132	124	7	0	0	0	7	21	38
Colorado	12	1	0	4	7	0	54,295	32	88	4	0	0	1	3	12	60
Illinois	65	25	0	0	40	0	152,268	78	118	20	1	0	0	19	24	34
Indiana	14	5	0	0	9	0	22,884	33	39	4	0	0	0	4	8	9
Kansas	97	48	0	8	39	2	357,121	227	228	26	6	0	1	19	57	47
Kentucky	23	8	0	0	15	0	32,701	56	86	3	0	0	0	3	5	21
Louisiana	65	23	3	0	39	0	603,318	187	190	8	0	0	0	8	31	32
North	6	2	0	0	4	0	28,182	53	83	0	0	0	0	0	17	8
South	50	15	3	0	32	0	502,891	107	85	8	0	0	0	8	14	23
Offshore	9	6	0	0	3	0	72,245	27	22	0	0	0	0	0	0	1
Michigan	7	3	0	0	3	1	19,441	17	22	4	1	0	0	3	7	10
Mississippi	15	6	0	0	9	0	120,728	33	14	9	2	0	0	7	17	5
Montana	3	0	0	0	3	0	17,104	28	24	3	0	0	0	3	14	8
Nebraska	17	6	0	0	11	0	98,205	45	40	7	1	0	0	6	22	28
New Mexico	56	42	0	6	8	0	263,435	145	85	7	0	0	1	6	26	17
Northwest	26	18	0	5	3	0	129,199	69	38	4	0	0	1	3	13	6
Southeast	30	24	0	1	5	0	134,236	76	47	3	0	0	0	3	13	11
New York	10	5	0	0	0	5	13,500	35	....	0	0	0	0	0	5	....
North Dakota	13	9	0	0	4	0	92,632	29	19	5	3	0	0	2	13	7
Ohio	24	15	0	5	4	0	54,317	34	67	0	0	0	0	0	0	1
Oklahoma	187	78	6	8	89	6	628,668	452	409	39	6	2	1	30	76	59
Pennsylvania	0	0	0	0	0	0	0	0	*16	0	0	0	0	0	0	*2
Texas	382	216	12	8	141	5	1,681,657	1,134	1,266	85	3	1	1	80	278	379
Dist. 1	15	8	0	0	7	0	63,121	55	55	5	0	0	0	5	21	28
Dist. 2	17	5	2	1	9	0	107,497	47	37	3	0	0	0	3	17	16
Dist. 3	15	4	2	0	9	0	104,582	78	107	3	0	0	0	3	15	36
Dist. 4	27	6	2	0	19	0	133,258	68	89	13	0	0	0	13	29	37
East	22	10	1	0	11	0	111,501	89	76	6	1	0	0	5	30	20
Dist. 7-B	39	21	0	0	18	0	154,223	124	170	12	1	0	0	11	45	68
West	137	101	1	1	32	2	673,005	358	353	26	1	0	0	25	61	62
Dist. 9	87	46	0	3	35	3	222,465	250	280	16	0	0	1	15	50	96
Dist. 10	23	15	4	3	1	0	112,005	65	99	1	0	1	0	0	10	16
Utah	9	7	0	1	1	0	52,487	14	11	2	0	0	1	1	4	7
West Virginia	13	0	0	11	2	0	38,024	31	42	0	0	0	0	0	0	3
Wyoming	21	8	0	0	13	0	94,550	52	62	10	0	0	0	10	22	24
Misc. (S. D., Va.)	5	0	0	4	1	0	26,272	13	10	1	0	0	0	1	9	4
Total U. S.	**1,118**	561	21	56	461	19	4,709,423	2,866	3,022	**249**	24	3	6	216	662	804
Total prev. week	1,403	652	56	115	542	38	6,474,533	.....	.....	324	19	5	19	281	.....	.....
Cum. 1958	2,866	1,352	79	183	1,189	63	12,313,876	.....	.....	662	46	8	27	581	.....	.....
Western Canada	40	27	0	0	13	0	201,223	122	61	9	0	0	0	9	32	20

*Includes New York.

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL PRODUCTION



ACTIVE ROTARY RIGS*

	1-20-58	1-13-58	1-6-58	1-21-57
Alabama	8	8	8	11
Arkansas	15	16	18	18
Arizona	1	1		
California	91	91	91	102
Colorado	33	37	33	41
Florida	1	1	1	2
Georgia				
Idaho				1
Illinois	38	57	44	41
Indiana	5	3	3	4
Iowa	3	3	2	1
Kansas	108	113	118	147
Kentucky	4	6	8	12
Louisiana	341	356	374	443
North	36	37	35	43
South	231	246	261	296
Offshore	74	73	78	104
Maryland			1	1
Michigan	6	6	7	10
Mississippi	47	51	54	23
Missouri				
Montana	29	29	29	21
Nebraska	20	18	21	24
Nevada				2
New Mexico	113	116	129	100
New York	1	1	1	
North Dakota	41	40	43	29
Ohio	2	1	1	
Oklahoma	190	210	220	230
Oregon				
Pennsylvania	8	9	7	9
South Dakota	1	1	1	1
Texas	750	787	865	957
Gulf Coast	153	160	191	243
Offshore	2	2	3	6
West	306	312	335	346
North	241	265	285	307
East	48	48	51	55
Tennessee				
Utah	50	49	50	32
Washington			1	1
West Virginia	4	4	2	2
Wyoming	47	48	50	48
Virginia				
Total United States	1,957	2,062	2,182	2,313
Western Canada	208	202	189	229
Eastern Canada	1	2	2	
Grand total	2,166	2,266	2,373	2,542

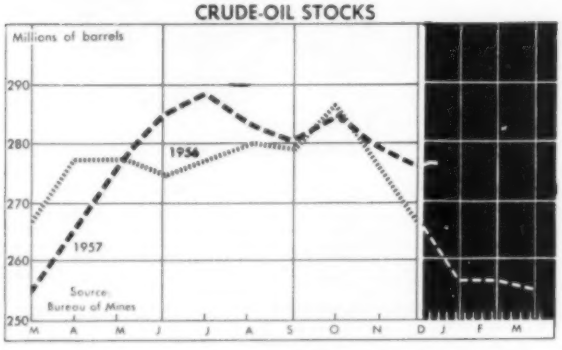
*Hughes Tool Co.

DAILY AVERAGE PRODUCTION FOR WEEK

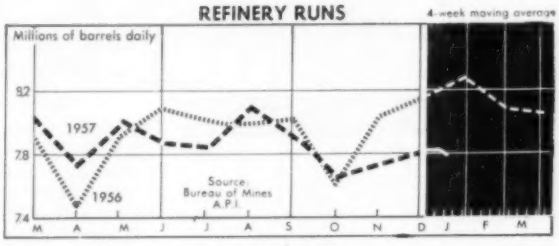
	January 18, 1958			Jan. 11
	Crude oil	Lease condensate	Total	total
Alabama	15,300		15,300	15,250
Arkansas	83,300	250	83,550	83,350
California	928,000		928,000	927,200
Colorado	141,225		141,225	142,000
Eastern	51,000		51,000	51,400
Florida	1,275		1,275	1,275
Illinois	236,600		236,600	234,900
Indiana	30,500		30,500	30,400
Kansas	†349,450		†349,450	†318,100
Kentucky	42,100		42,100	40,800
Louisiana	755,950	90,200	846,150	845,975
North	111,900	2,700	114,600	114,425
South	644,050	87,500	731,550	731,550
Michigan	26,300		26,300	27,400
Mississippi	101,075	4,325	105,400	105,400
Montana	74,200		74,200	74,800
Nebraska	54,925		54,925	54,950
Nevada	150		150	150
New Mexico	264,385	5,700	270,085	268,125
North Dakota	41,800		41,800	36,900
Oklahoma	†581,700		†581,700	†558,200
Texas	2,665,000	60,100	2,725,100	2,725,100
Dist. 1	46,000	550	46,550	46,550
Dist. 2	119,000	9,400	128,400	128,400
Dist. 3	381,000	29,000	410,000	410,000
Dist. 4	197,000	6,400	203,400	203,400
Dist. 5	32,000	550	32,550	32,550
Dist. 6	117,000	7,000	124,000	124,000
East Texas Field	161,000		161,000	161,000
Dist. 7-B	146,000	150	146,150	146,150
Dist. 7-C	147,000	4,075	151,075	151,075
Dist. 8	1,017,000	1,650	1,018,650	1,018,650
Dist. 9	198,000	725	198,725	198,725
Dist. 10	104,000	600	104,600	104,600
Utah	13,525		13,525	12,750
Wyoming	303,750		303,750	312,400
Others	‡200		‡200	‡200
Total U. S.	6,761,710	160,575	**6,922,285**	6,867,025
Change from prev. week, up			**55,260**	
Canada	†481,800		†481,800	†414,100
Total U. S. Prod.—Jan. 1—Jan. 18				123,962,870 bbl.
Same period last year (crude plus cond.)				*134,555,857 bbl.

*Includes 2,650,590 bbl. condensate. †Week ended previous Monday. ‡South Dakota.

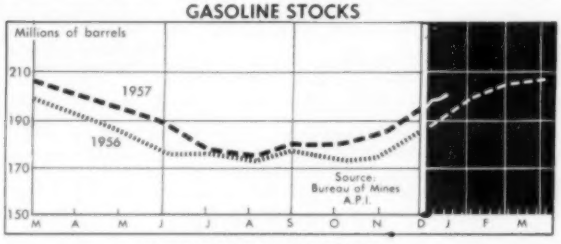
CRUDE-OIL STOCKS



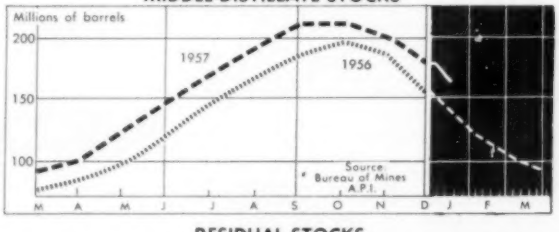
REFINERY RUNS



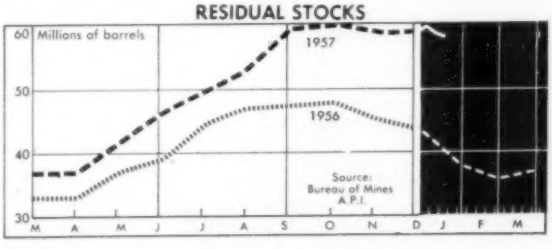
GASOLINE STOCKS



MIDDLE-DISTILLATE STOCKS



RESIDUAL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	1-11-58	1-4-58	1-12-57
Pennsylvania Grade	2,922	2,949	2,318
Other Appalachian	1,618	1,679	2,090
Illinois, Indiana, and Michigan	11,554	11,516	11,321
Nebraska and North Dakota	2,351	2,291	2,222
Kansas	9,594	9,441	10,047
Oklahoma	19,397	19,764	22,885
Arkansas	2,723	2,805	2,728
Louisiana	19,836	19,852	19,198
North	3,134	3,163	2,853
South	16,702	16,689	16,345
Mississippi, Alabama, and Florida	2,594	2,444	2,656
New Mexico	9,374	9,742	7,717
Texas	119,989	121,246	113,973
East Texas	9,270	8,990	9,315
West Texas	53,027	53,509	53,381
Texas Gulf	24,860	24,798	21,684
Other Texas	32,832	33,949	29,593
Wyoming	13,971	14,121	16,751
Other Rocky Mountain	6,826	6,522	6,609
California	36,663	35,601	27,841
Foreign	†17,325	17,026	11,301
Total	276,737	276,999	259,657

*Bureau of Mines. †Includes 6,199,000 bbl. in California.

API REFINERY REPORT—JANUARY 17, 1958

(Thousands of barrels)

										Bureau of Mines, January 1957				
	Daily	Daily average production				Stocks‡				Daily	Daily average production			
District—	avg. runs	Gaso.*	Kero.	Dist.	Resid.	Gaso.†	Kero.	Dist.	Resid.	avg. runs	Gaso.*	Kero.	Dist.	Resid.
East Coast	1,154	500.8	48.4	362.3	180.7	44,153	11,354	51,982	11,801	1,214	505.7	39.9	370.5	244.6
Appalachian:														
District 1	100	39.1	4.2	25.9	9.6	5,118	562	2,709	698	103	30.6	6.3	24.0	9.5
District 2	79	47.6	6.6	15.0	9.6	2,748	403	1,012	459	111	53.3	6.9	20.7	16.7
Ind., Ill., Ky.	1,380	732.0	79.4	333.1	185.3	35,011	5,521	17,839	5,424	1,463	740.7	70.4	345.0	220.4
Minn., Wis., Dak.	105	49.9	7.0	29.6	11.6	6,857	957	6,575	402	100	47.9	5.6	25.7	12.5
Okla., Kans., Mo.	739	403.0	13.6	198.3	38.0	17,959	937	10,438	1,325	714	395.7	16.6	184.8	41.5
Inland Texas	270	200.7	15.7	46.3	18.6	8,117	437	1,657	2,066	279	198.0	7.3	52.0	27.0
Texas Gulf Coast	1,792	879.4	122.4	511.3	185.1	27,374	2,273	15,969	6,031	2,033	914.6	135.1	595.8	257.6
La. Gulf Coast	634	339.0	59.3	145.7	43.6	12,744	1,432	6,716	1,384	704	346.5	62.1	218.6	61.1
N. La. and Ark.	96	36.6	9.4	21.1	8.3	4,784	828	1,971	184	101	41.1	9.4	24.7	8.9
Rocky Mountain:														
New Mexico	30	14.9	1.0	7.0	3.7	413	24	137	91	28	13.9	0.3	5.3	3.6
Other Rocky Mt.	257	120.7	5.7	72.4	38.0	6,683	297	2,776	1,035	286	137.2	2.4	66.6	41.0
West Coast	1,039	454.0	14.7	193.9	286.8	28,665	318	15,625	27,052	1,138	504.0	4.9	184.4	377.9
Jan. 17, 1958	7,675	3,817.7	387.4	1,961.9	1,018.9	200,636	25,343	135,406	57,952	8,274	3,939.2	367.2	2,118.1	1,322.3
Jan. 10, 1958	7,772	3,854.4	360.6	1,884.1	1,100.7	198,738	27,261	141,349	58,257					
Jan. 18, 1957	8,120	3,872.4	353.1	2,120.1	1,274.7	191,373	27,542	114,424	41,009					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (89 octane)	11.25-11.75
Premium (98 octane)	14.00-14.50
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.50-11.00
Regular (92 octane)	10.75-11.25
Premium (97 octane)	12.25-12.75
Premium (98 octane)	12.50-13.00
California (rack) (Los Angeles):	
Regular (88 octane)	12.2
★ Premium (96 octane)	14.5
Premium (98 octane)	15.0
Caribbean area (cargoes):	
Regular (87 octane)	10.375
Premium (93 octane)	11.25

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100 per cent, prices for lower-vapor-pressure grades increase 2.5 per cent for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.875-10.25
Diesel oil (58 d.i. and above)	9.50-10.00
Distillate No. 1	9.50-10.00
Distillate No. 2	8.875-9.25
Gulf Coast (cargoes):	
Kerosine 41-43	8.75-9.00
★ Distillate No. 2	8.50-8.75
New York Harbor (barges):	
★ Kerosine 41-43	10.55-10.75
★ Distillate No. 2	10.05-10.25
★ Diesel fuel, 48-52 d.i.	10.35-10.55
Caribbean area (cargoes):	
Distillate No. 2	9.00

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank cars	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
★ Residual fuel (max. 1% S)	$1.40-1.60
Gulf Coast (cargoes):	
Bunker C fuel	$2.50-2.75
New York Harbor (barges):	
Bunker C fuel	$2.95
Caribbean (cargoes):	
Bunker C	$2.55
California (rack):	
Bunker C fuel, Los Angeles	$2.65-2.80

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 p.p., 95 v.i.	25.5
200 vis. neutral oil, solvent refined, 0-10 p.p., 95 v.i.	22.25
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	27
200 vis. neutral (180° at 100°), 25 p.t.	25

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Mid-Cont.*	Gulf Coast Tex.†	West Tex.‡ N.M.	Wyo. (sour) (§)
14-14.9	$2.67	....	....	....	....
15-15.9	2.71	....	....	....	$1.81
16-16.9	2.74	....	....	....	1.86
17-17.9	2.78	....	....	....	1.91
18-18.9	2.82	....	....	....	1.96
19-19.9	2.85	....	....	....	2.01
20-20.9	2.89	$2.75	....	$2.62	2.06
21-21.9	2.93	2.77	....	2.64	2.11
22-22.9	2.97	2.79	....	2.66	2.16
23-23.9	3.01	2.81	$3.44	2.68	2.21
24-24.9	3.05	2.83	3.46	2.70	2.26
25-25.9	3.09	2.85	3.48	2.72	2.31
26-26.9	3.13	2.87	3.50	2.74	2.36
27-27.9	3.17	2.89	3.52	2.76	2.49
28-28.9	3.22	2.91	3.54	2.78	2.54
29-29.9	3.27	2.93	3.56	2.80	2.59
30-30.9	3.32	2.95	....	2.82	2.63
31-31.9	3.38	2.97	....	2.84	2.67
32-32.9	3.44	2.99	....	2.86	2.71
33-33.9	3.50	3.01	....	2.88	2.75
34-34.9	3.56	3.03	....	2.90	2.79
35-35.9	3.61	3.05	....	2.92	2.83
36-36.9	3.65	3.07	....	2.94	2.87
37-37.9	3.68	3.09	....	2.96	2.89
38-38.9	....	3.11	....	2.98	2.91
39-39.9	....	3.13	....	3.00	2.93
40 and up	....	3.15	....	3.02	2.95

*Includes Oklahoma, part of Kansas, North Dakota, West Texas (sweet) and North Central Texas. †Low cold test Gulf Coast. ‡Sour. §Most buyers are posting Wyoming sour in two schedules, 15°-26.9° and 27°-40°.

Effective dates: California January 17, 1957, east of California, January 3-January 10, 1957; Pennsylvania Grade, July 26, 1957.

FLAT PRICES

Louisiana:	
Bienville (distillate)	$3.05
Ville Platte	3.45
Texas:	
East Texas	3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.65
Middle District	4.47
Southwest Pennsylvania	4.18
West Virginia	4.00
Buckeye Grade	4.00
Zanesville Grade	3.04
Illinois Basin	3.00-3.05
Canada:	
Leduc-Woodbend	2.74
Redwater (Alta.)	2.63
Smiley (Sask.)	2.40
Pembina	2.61

FOREIGN

Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.75
San Joaquin, 41°-41.9°, Puerto La Cruz	3.34
Oficina, 35°-35.9°, Puerto La Cruz	3.05
Tia Juana medium, 26.5°-26.9°, Amuay*	2.55
Quiriquire, 16.5°-16.9°, Caripito	2.45
Lagunillas heavy, flat, Amuay or Las Piedras*	2.38
Bachaquero, flat, Las Piedras*	2.23

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes, f.o.b. lifting port):	
Arabian, 36.0°-36.9°, Ras Tanura	$2.12
Iranian, 34.0°-34.9°, Bandar Masur	2.04
Iranian, 34.0°-34.9°, Abadan	1.99
Iraq, 35.0°-35.9°, Fao	1.98
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.85
Qatar, 41.0°-41.9°, Umm Said	2.23
Middle East, E. Mediterranean:	
Arabian, 36.0°-36.9°, Sidon	2.59
Iraq, 36.0°-36.9°, Tripoli, Banias	2.59
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.75

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(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC—12.5%)	$2.49
★ Gulf-U.S.N.H., dirty (USMC—30.0%)	2.00
★ Carib.-U.S.N.H., dirty (USMC—60.0%)	1.08
★ P.G.-U.K., dirty (Scale—72.5%) (14s. 10d.)	2.08
★ P.G.-France, dirty (USMC—80%)	2.18

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WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil Journal.

WELL DRILLS - CORE DRILLS. Everything for well and core drilling in both new and used equipment, at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

ONE 28L BUCYRUS-ERIE cable tool rig, dog house, light plant, forge and drilling tools. Phone L. E. Reames Jr., 480-M; L. E. Reames Drlg. Co., 92. Or write L. E. Reames Drlg. Co., Rt. #1 Fairmont Addition, Pawhuska, Oklahoma. Inventories furnished upon request.

COMPLETE Bulk Sand Fracturing Plant & Two Bulk Trucks, consisting of 450 ton storage, belt conveyor, bucket elevator, loading hopper, portable bazooka. Can be moved to any railroad siding. Will sell all or any part at a sacrifice. $15,000.000 FOB Charlotte, Texas. Call Glen H. Arthur—Mohawk 4-7782 or MO 4-4122, Alice, Texas.

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Box K-522, The Oil and Gas Journal, Tulsa, Oklahoma.

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Welded Fittings and other supplies to oil, gas, and power; southwest territory. Expansion program, national AAA 1# firm. Salary dependent upon background; car and expenses; substantial other benefits.

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Excellent opportunity for experienced man 40-45 years of age to manage complete new foreign refinery of 30,000 BPD. Must be capable of assuming full responsibility all phases of operations and management. Ability to correlate American and foreign personnel is essential.

Assignment of several years, with family, in good climate and living conditions. Send personal history with complete details to:

Box K-514,
The Oil and Gas Journal,
Tulsa, Oklahoma.

HELP WANTED

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DIRECTOR OF PERSONNEL

LEONARD REFINERIES, Inc.
ALMA, MICHIGAN

REFINERY MANAGER

This opening is in the 25,000 barrel refinery of an independent oil company in the continental United States. It is a complete modern facility with excellent growth prospects. The man desired is preferably graduate engineer and must have thorough experience supervision of refinery operation and maintenance along with detailed knowledge refinery economics.

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Mechanical Engineer for 30,000 barrel refinery in Middle West. 5 years or more experience qualified in structural, pressure vessel and similar work in refinery including engineering for maintenance. Some field experience desirable. Good location near important city with excellent residential and other facilities.

Reply to R. O. BURK,

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Immediate opening for salesman of refined products who has considerable background and experience in refinery sales and a person with excellent past performance record. Prefer college graduate under 40. For full consideration send detailed resume of background and experience and salary requirements together with any information that may be of help in evaluating your application. Also prefer snapshot if available.

REPLY TO

Box K-518,
The Oil and Gas Journal,
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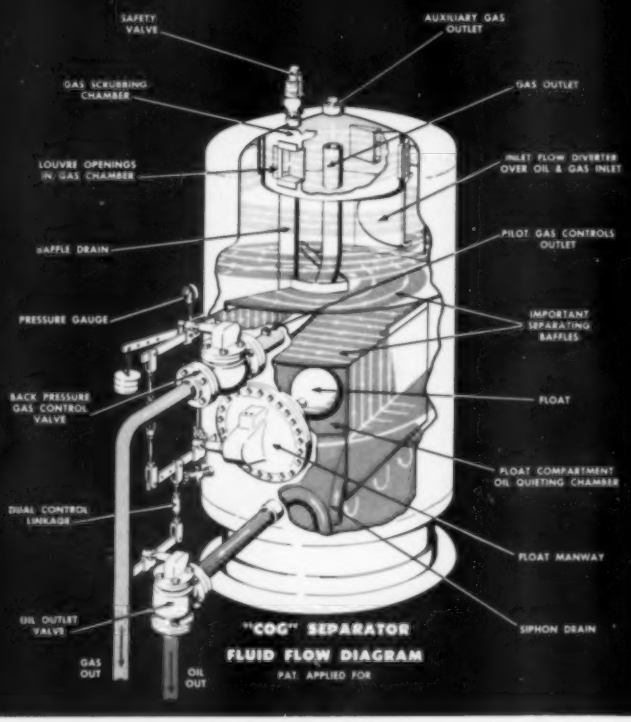

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